NASA PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

JUNE 1989

(NASA-SP-7039(35)-Sect-1) NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY. SECTION 1: ABSTRACTS (SUPPLEMENT 35) (NASA) 38 p CSCL 05B

N89-25775

Unclas
00/82 0219661

ACCESSION NUMBER RANGES

Bibliography Number	*STAR Accession Numbers*
NASA SP-7039(04) SEC 1	N69-20701 - N73-33931
NASA SP-7039(12) SEC 1	N74-10001 - N77-34042
NASA SP-7039(13) SEC 1	N78-10001 - N78-22018
NASA SP-7039(14) SEC 1	N78-22019 - N78-34034
NASA SP-7039(15) SEC 1	N79-10001 - N79-21993
NASA SP-7039(16) SEC 1	N79-21994 - N79-34158
NASA SP-7039(17) SEC 1	N80-10001 - N80-22254
NASA SP-7039(18) SEC 1	N80-22255 - N80-34339
NASA SP-7039(19) SEC 1	N81-10001 - N81-21997
NASA SP-7039(20) SEC 1	N81-21998 - N81-34139
NASA SP-7039(21) SEC 1	N82-10001 - N82-22140
NASA SP-7039(22) SEC 1	N82-22141 - N82-34341
NASA SP-7039(23) SEC 1	N83-10001 - N83-23266
NASA SP-7039(24) SEC 1	N83-23267 - N83-37053
NASA SP-7039(25) SEC 1	N84-10001 - N84-22526
NASA SP-7039(26) SEC 1	N84-22527 - N84-35284
NASA SP-7039(27) SEC 1	N85-10001 - N85-22341
NASA SP-7039(28) SEC 1	N85-22342 - N85-36162
NASA SP-7039(29) SEC 1	N86-10001 - N86-22536
NASA SP-7039(30) SEC 1	N86-22537 - N86-33262
NASA SP-7039(31) SEC 1	N87-10001 - N87-20170
NASA SP-7039(32) SEC 1	N87-20171 - N87-30248
NASA SP-7039(33) SEC 1	N88-10001 - N88-20253
NASA SP-7039(34) SEC 1	N88-20254 - N88-30583
NASA SP-7039(35) SEC 1	N89-10001 - N89-20085

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NASA

PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

Annotated references to NASA-owned inventions covered by U.S. patents and applications for patent that were announced in *Scientific and Technical Aerospace Reports (STAR)* between January 1989 and June 1989.

National Aeronautics and Space Administration
Office of Management
Scientific and Technical Information Division
Washington, DC 1989

INTRODUCTION

Several thousand inventions result each year from the aeronautical and space research supported by the National Aeronautics and Space Administration. The inventions having important use in government programs or significant commercial potential are usually patented by NASA. These inventions cover practically all fields of technology and include many that have useful and valuable commercial application.

NASA inventions best serve the interests of the United States when their benefits are available to the public. In many instances, the granting of nonexclusive or exclusive licenses for the practice of these inventions may assist in the accomplishment of this objective. This bibliography is published as a service to companies, firms, and individuals seeking new, licensable products for the commercial market.

The *NASA Patent Abstracts Bibliography (NASA PAB)* is a semiannual NASA publication containing comprehensive abstracts and indexes of NASA-owned inventions covered by U.S. patents and applications for patent. The citations included in *NASA PAB* were originally published in NASA's *Scientific and Technical Aerospace Reports (STAR)* and cover *STAR* announcements made since May 1969.

For the convenience of the user, each issue of *NASA PAB* has a separately bound Abstract Section (Section 1) and Index Section (Section 2). Although each Abstract Section covers only the indicated six-month period, the Index Section is cumulative covering all NASA-owned inventions announced in *STAR* since 1969. Thus a complete set of *NASA PAB* would consist of the Abstract Sections of Issue 04 (January 1974) and Issue 12 (January 1978) and the Abstract Section for all subsequent issues and the Index Section for the most recent issue.

The 58 citations published in this issue of the Abstract Section cover the period January 1989 through June 1989. The Index Section references over 4600 citations covering the period May 1969 through June 1989.

ABSTRACT SECTION (SECTION 1)

This *PAB* issue includes 10 major subject divisions separated into 76 specific categories and one general category/division. (See Table of Contents for the scope note of each category, under which are grouped appropriate NASA inventions.) This scheme was devised in 1975 and revised in 1987 in lieu of the 34 category divisions which were utilized in *PAB* supplements (01) through (06) covering *STAR* abstracts from May 1969 through January 1974. Each entry in the Abstract Section consists of a *STAR* citation accompanied by an abstract and, when appropriate, a key illustration taken from the patent or application for patent. Entries are arranged by subject category in order of the ascending NASA Accession Number originally assigned for *STAR* to the invention. The range of NASA Accession Numbers within each issue is printed on the inside front cover.

Abstract Citation Data Elements: Each of the abstract citations has several data elements useful for identification and indexing purposes, as follows:

NASA Accession Number
NASA Case Number
Inventor's Name
Title of Invention
U.S. Patent Application Serial Number
U.S. Patent Number (for issued patents only)
U.S. Patent Office Classification Number(s)
(for issued patents only)

These data elements are identified in the Typical Citation and Abstract and in the indexes.

INDEX SECTION (SECTION 2)

The Index Section is divided into five indexes. These indexes are cross-indexed and are used to locate a single invention or groups of inventions.

Subject Index: Lists all inventions according to appropriate alphabetized technical term and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

Inventor Index: Lists all inventions according to alphabetized names of inventors and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

Source Index: Lists all inventions according to alphabetized source of invention (i.e., name of contractor or government installation where invention was made) and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

Number Index: Lists inventions in order of ascending (1) NASA Case Number, (2) U.S. Patent Application Serial Number, (3) U.S. Patent Classification Number, and (4) U.S. Patent Number and indicates the related Subject Category Number and the Accession Number.

Accession Number Index: Lists all inventions in order of ascending Accession Number and indicates the related Subject Category Number, the NASA Case Number, the U.S. Patent Application Serial Number, the U.S. Patent Classification Number, and the U.S. Patent Number.

HOW TO USE THIS PUBLICATION TO IDENTIFY NASA INVENTIONS

To identify one or more NASA inventions within a specific technical field or subject, several techniques are possible with the flexibility incorporated into the *NASA PAB*.

(1) *Using Subject Category:* To identify all NASA inventions in any one of the subject categories in this issue of *NASA PAB*, select the desired Subject Category in the Abstract Section (Section 1) and find the inventions abstracted thereunder.

(2) *Using Subject Index:* To identify all NASA inventions listed under a desired technical subject index term, (A) turn to the cumulative Subject Index in the Index Section and find the invention(s) listed under the desired technical subject term. (B) Note the indicated Accession Number and the Subject Category Number. (C) Using the indicated Accession Number, turn to the inside front cover of the Index Section to determine which issue of the Abstract Section includes the Accession Number desired. (D) To find the abstract of the particular invention in the issue of the Abstract Section selected, (1) use the Subject Category Number to locate the Subject Category and (2) use the Accession Number to locate the desired invention within the Subject Category listing.

(3) *Using Patent Classification Index:* To identify all inventions covered by issued NASA patents (not including applications for patent) within a desired Patent Classification, (A) turn to the Patent Classification Number in the Number Index of Section 2 and find the associated invention(s), and (B) follow the instructions outlined in (2)(B), and (D) above.

TYPICAL CITATION AND ABSTRACT

NASA SPONSORED

ACCESSION NUMBER → **N89-12621*** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX. ← CORPORATE SOURCE

TITLE → **SPACE STATION ERECTABLE MANIPULATOR PLACEMENT SYSTEM Patent**

INVENTOR → MARGARET E. GRIMALDI, inventor (to NASA) 20 Sep. 1988 7 p Filed 13 Nov. 1986 Supersedes N87-18596 (25 - 11, p 1446)

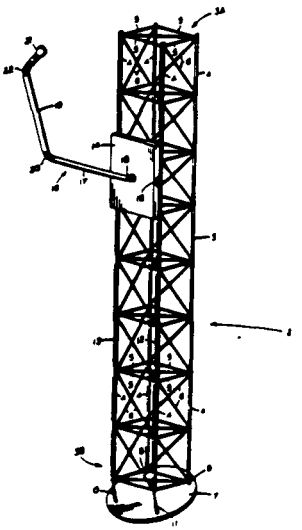
NASA CASE NUMBER → (NASA-CASE-MSC-21096-1; US-PATENT-4,772,175;

US PATENT APPLICATIONS SERIAL NUMBER → US-PATENT-APPL-SN-929865; US-PATENT-CLASS-414-689; US-PATENT-CLASS-414-718; US-PATENT-CLASS-414-735; US-PATENT-CLASS-212-225; US-PATENT-CLASS-212-257; US-PATENT-CLASS-182-103) Avail: US Patent and Trademark Office ← AVAILABILITY SOURCE

COSATI CODE → CSCL 22A

A habitable space station was proposed for low earth orbit, to be constructed from components which will be separately carried up from the earth and thereafter assembled. A suitable manipulating system having extraordinary manipulative capability is required. The ← ABSTRACT invention is an erectable manipulator placement system for use on a space station and comprises an elongate, lattice-like boom having guide tracks attached thereto, a carriage-like assembly pivotally mounted on and extending from said dolly. The system further includes a turntable base pivotally interconnected with the proximal end of the boom and positioned either on a part of a transferring vehicle, or on another payload component being carried by the said transferring vehicle, or on the space station. Novelty resides in the use of a turntable base having a hinged boom with a dolly translatable therealong to carry the arm-like assembly, thus providing an additional 3 degrees of freedom to the arm.

Official Gazette of the U.S. Patent and Trademark Office



← KEY ILLUSTRATION

TABLE OF CONTENTS

Section 1 • Abstracts

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics.*

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; space communications, spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*

GEOSCIENCES

Includes geosciences (general); earth resources and remote sensing; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.

For related information see also *Space Sciences.*

42 GEOSCIENCES (GENERAL) **N.A.**

43 EARTH RESOURCES AND REMOTE SENSING **N.A.**

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography.*

44 ENERGY PRODUCTION AND CONVERSION **N.A.**

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *28 Propellants and Fuels.*

45 ENVIRONMENT POLLUTION **N.A.**

Includes atmospheric, noise, thermal, and water pollution.

46 GEOPHYSICS **N.A.**

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

47 METEOROLOGY AND CLIMATOLOGY **N.A.**

Includes weather forecasting and modification.

48 OCEANOGRAPHY **N.A.**

Includes biological, dynamic, and physical oceanography; and marine resources.

For related information see also *43 Earth Resources and Remote Sensing.*

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and space biology.

51 LIFE SCIENCES (GENERAL) **17**

52 AEROSPACE MEDICINE **18**

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

53 BEHAVIORAL SCIENCES **N.A.**

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT **18**

Includes human engineering; biotechnology; and space suits and protective clothing.

For related information see also *16 Space Transportation.*

55 SPACE BIOLOGY **N.A.**

Includes exobiology; planetary biology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) **N.A.**

60 COMPUTER OPERATIONS AND HARDWARE **N.A.**

Includes hardware for computer graphics, firmware, and data processing.

For components see *33 Electronics and Electrical Engineering.*

61 COMPUTER PROGRAMMING AND SOFTWARE **N.A.**

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

62 COMPUTER SYSTEMS **N.A.**

Includes computer networks and special application computer systems.

63 CYBERNETICS **N.A.**

Includes feedback and control theory, artificial intelligence, robotics and expert systems.

For related information see also *54 Man/System Technology and Life Support.*

64 NUMERICAL ANALYSIS **N.A.**

Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY **N.A.**

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS **N.A.**

Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS **N.A.**

Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.

For related information see also *Engineering.*

70 PHYSICS (GENERAL) **N.A.**

For precision time and time interval (PTTI) see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics, 90 Astrophysics,* or *92 Solar Physics.*

Note: N.A. means that no abstracts were assigned to this category for this issue.

Section 2 • Indexes

JUNE 1989 (Supplement 35)

NASA Patent Abstracts Bibliography

A Semiannual Publication of the National Aeronautics and Space Administration

02

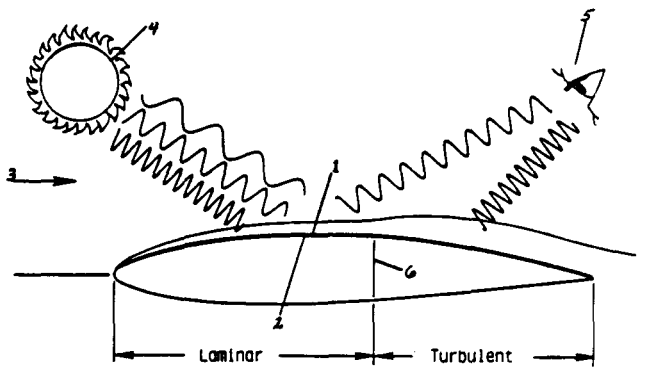
AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

N89-12551* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
METHOD FOR LAMINAR BOUNDARY LAYER TRANSITION VISUALIZATION IN FLIGHT Patent
BRUCE J. HOLMES, inventor (to NASA) and PETER D. GALL, inventor (to NASA) 4 Oct. 1988 5 p Filed 13 Nov. 1986 Supersedes N87-18535 (25 - 11, p 1435)
(NASA-CASE-LAR-13554-1; US-PATENT-4,774,835; US-PATENT-APPL-SN-929862; US-PATENT-CLASS-73-147; US-PATENT-CLASS-116-265; US-PATENT-CLASS-116-DIG.43)
Avail: US Patent and Trademark Office CSCL 01A

Disclosed is a method of visualizing laminar to turbulent boundary layer transition, shock location, and laminar separation bubbles around a test surface. A liquid crystal coating is formulated using an unencapsulated liquid crystal operable in a temperature bandwidth compatible with the temperature environment around the test surface. The liquid crystal coating is applied to the test surface, which is preferably pretreated by painting with a flat, black paint to achieve a deep matte coating, after which the surface is subjected to a liquid or gas flow. Color change in the liquid crystal coating is produced in response to differences in relative shear stress within the boundary layer around the test surface. The novelty of this invention resides in the use of liquid crystals which are sensitive to shear stress to show aerodynamic phenomena such as a boundary layer transition, shock location, and laminar separation bubbles around a test surface.

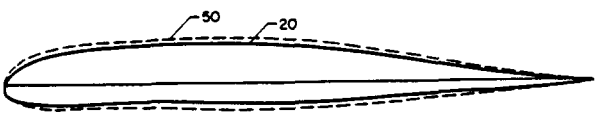
Official Gazette of the U.S. Patent and Trademark Office



N89-14224* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
HIGH LIFT, LOW PITCHING MOMENT AIRFOILS Patent
KEVIN W. NOONAN, inventor (to NASA) 11 Oct. 1988 19 p Filed 5 Sep. 1986 Supersedes N87-14282 (25 - 06, p 715)
(NASA-CASE-LAR-13215-1; US-PATENT-4,776,531; US-PATENT-APPL-SN-904132; US-PATENT-CLASS-244-35-R; US-PATENT-CLASS-416-223-R) Avail: US Patent and Trademark Office CSCL 01A

Two families of airfoil sections which can be used for helicopter/rotorcraft rotor blades or aircraft propellers of a particular shape are prepared. An airfoil of either family is one which could be produced by the combination of a camber line and a thickness distribution or a thickness distribution which is scaled from these. An airfoil of either family has a unique and improved aerodynamic performance. The airfoils of either family are intended for use as inboard sections of a helicopter rotor blade or an aircraft propeller.

Official Gazette of the U.S. Patent and Trademark Office



03

AIR TRANSPORTATION AND SAFETY

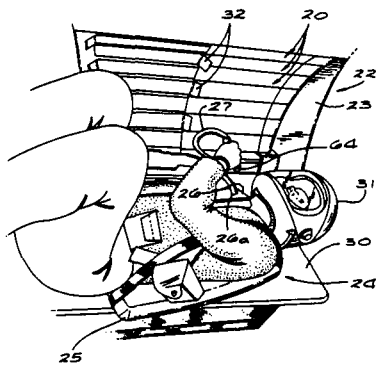
Includes passenger and cargo air transport operations; and aircraft accidents.

N89-11724*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
EMERGENCY EGRESS FIXED ROCKET PACKAGE Patent Application
MARGARET A. ALLEN, inventor (to NASA) (Rockwell International Corp., Houston, Tex.) 9 Sep. 1988 13 p
(NASA-CASE-MSC-21332-1; NAS 1.71:MSC-21332-1; US-PATENT-APPL-SN-242253) Avail: NTIS HC A03/MF A01 CSCL 06K

A method of effecting the in-flight departure of an astronaut from a shuttle craft, and apparatus is presented. A plurality of removeable compartment covers are provided, behind which rocket assemblies are stowed. To actuate the system, the astronaut pulls off a tab from one of the compartments which exposes a cannister having a lanyard with a hook. The lanyard extends around a spring biased sleeve with a safety lever preventing rocket ignition until the hook is moved by the astronaut. Upward movement of the hook allows the trigger mechanism to actuate the system resulting in the rods projecting out of the hatch. When the lanyard becomes

taut, a lanyard elongation detector transmits a signal to the firing mechanisms to fire the rocket.

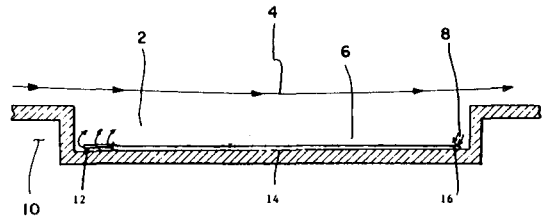
NASA



CSCL 01C

A device is introduced for reducing drag and store separation difficulties caused by shallow cavities on aircraft in supersonic flight consisting of a group of hollow pipes the same length as the cavity. The pipes are attached to the cavity floor so as to allow air to flow through the pipes. This device allows air to flow through the pipes opposite to the direction of flow outside the pipes. This results in reduced drag and improved store separation characteristics.

NASA



05

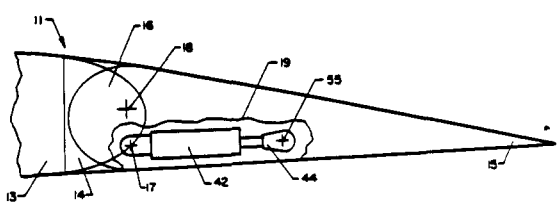
AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

N89-11738* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
CONTROL SURFACE ACTUATOR Patent
GERHARD E. SEIDEL, inventor (to NASA) (Boeing Commercial Airplane Co., Renton, Wash.) 27 Sep. 1988 6 p Filed 23 Mar. 1987 Supersedes N87-24461 (25 - 18, p 2430)
(NASA-CASE-LAR-12852-1; US-PATENT-4,773,620; US-PATENT-APPL-SN-028832; US-PATENT-CLASS-244-75-R; US-PATENT-CLASS-244-78) Avail: US Patent and Trademark Office CSCL 01C

A device which actuates aircraft control surfaces is disclosed. The actuator is disposed entirely within the control surface structure. This allows the gap between the wing structural box and the control surface to be reduced. Reducing the size of the gap is especially desirable for wings with high aspect ratio, wherein the volume of the structural box is at a premium.

Official Gazette of the U.S. Patent and Trademark Office

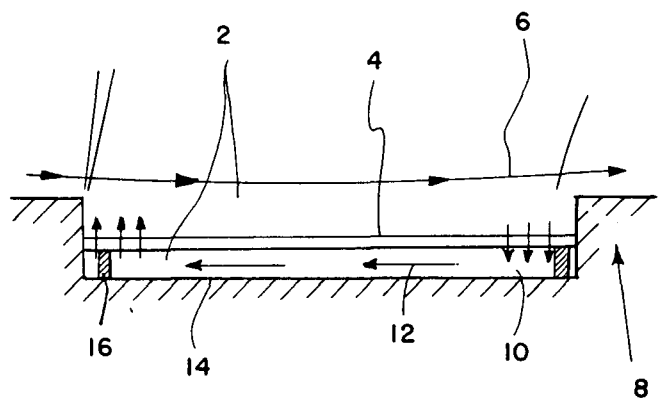


N89-14232*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
PASSIVE VENTING TECHNIQUE FOR SHALLOW CAVITIES Patent Application
ROBERT L. STALLINGS, JR., inventor (to NASA) and FLOYD J. WILCOX, JR., inventor (to NASA) 30 Sep. 1988 9 p
(NASA-CASE-LAR-14031-1; NAS 1.71:LAR-14031-1; US-PATENT-APPL-SN-252081) Avail: NTIS HC A02/MF A01

N89-14233*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
PASSIVE VENTING TECHNIQUE FOR SHALLOW CAVITIES Patent Application
ROBERT L. STALLINGS, JR. and FLOYD J. WILCOX, JR. 28 Sep. 1988 11 p
(NASA-CASE-LAR-13875-1; NAS 1.71:LAR-13875-1; US-PATENT-APPL-SN-250468) Avail: NTIS HC A03/MF A01 CSCL 01C

A device is disclosed for reducing drag and store separation difficulties caused by shallow cavities on aircraft in supersonic flight consisting of a slab of porous material cut to fit precisely inside the cavity. This slab is mounted inside the cavity such that a plemun chamber is formed between the slab and the floor of the cavity. This device allows air to flow through the chamber opposite to the direction of flow outside the chamber. This results in reduced drag and improved store separation characteristics.

NASA



18

SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls.

N89-12621* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
SPACE STATION ERECTABLE MANIPULATOR PLACEMENT SYSTEM Patent
MARGARET E. GRIMALDI, inventor (to NASA) 20 Sep. 1988 7 p Filed 13 Nov. 1986 Supersedes N87-18596 (25 - 11, p 1446)
(NASA-CASE-MSC-21096-1; US-PATENT-4,772,175; US-PATENT-APPL-SN-929865; US-PATENT-CLASS-414-689; US-PATENT-CLASS-414-718; US-PATENT-CLASS-414-735; US-PATENT-CLASS-212-225; US-PATENT-CLASS-212-257; US-PATENT-CLASS-182-103) Avail: US Patent and Trademark Office CSCL 22A

A habitable space station was proposed for low earth orbit, to be constructed from components which will be separately carried up from the earth and thereafter assembled. A suitable manipulating system having extraordinary manipulative capability is required. The invention is an erectable manipulator placement system for use on a space station and comprises an elongate, lattice-like boom having guide tracks attached thereto, a carriage-like assembly pivotally mounted on and extending from said dolly. The system further includes a turntable base pivotally interconnected with the proximal end of the boom and positioned either on a part of a transferring vehicle, or on another payload component being carried by the said transferring vehicle, or on the space station. Novelty resides in the use of a turntable base having a hinged boom with a dolly translatable therealong to carry the arm-like assembly, thus providing an additional 3 degrees of freedom to the arm.

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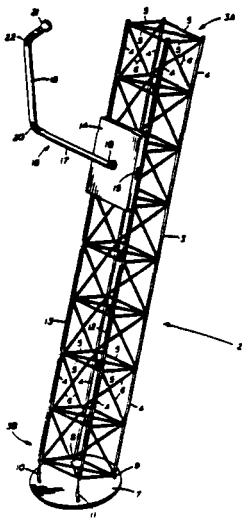

23

CHEMISTRY AND MATERIALS (GENERAL)

N89-11814*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
POLYPHENYLQUINOXALINES VIA AROMATIC NUCLEOPHILIC DISPLACEMENT Patent Applications
PAUL M. HERGENROTHER and JOHN W. CONNELL 28 Sep. 1988 14 p
(NASA-CASE-LAR-13988-1; NAS 1.71:LAR-13988-1; US-PATENT-APPL-SN-250661) Avail: NTIS HC A03/MF A01 CSCL 07A

Polyphenylquinoxalines are produced by an aromatic nucleophilic displacement reaction involving an activated aromatic dihalide with an appropriate quinoxaline monomer. Polyphenylquinoxalines are high temperature thermoplastics used as adhesives, coatings, films and composite matrices. The novelty of this invention is threefold: (1) some of the quinoxaline monomers are new compositions of matter; (2) the phenylquinoxaline polymers which are the end products of the invention are new compositions of matter; and (3) the method of forming the polymers is novel, replacing a more costly prior art process, which is also limited in the kinds of products prepared therefrom.

NASA

N89-12667* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
POLYENAMINES FROM AROMATIC DIACETYLENIC DIKETONES AND DIAMINES Patent
PAUL M. HERGENROTHER, inventor (to NASA), ROBERT G. BASS, inventor (to NASA), MARK S. SINSKY, inventor (to NASA), and JOHN W. CONNELL, inventor (to NASA) (Virginia Commonwealth Univ., Richmond.) 27 Sep. 1988 7 p Division of US-Patent-4,663,483; US-Patent-Appl-SN-734,366, filed 15 May 1985
(NASA-CASE-LAR-13444-2-CU; US-PATENT-4,774,359; US-PATENT-APPL-SN-000692; US-PATENT-CLASS-564-396; US-PATENT-CLASS-564-315; US-PATENT-CLASS-564-323; US-PATENT-CLASS-564-330; US-PATENT-CLASS-564-342; US-PATENT-CLASS-564-344; US-PATENT-CLASS-564-430) Avail: US Patent and Trademark Office CSCL 07A

The synthesis and characterization of several polyenamine ketones are discussed wherein conjugated diacetylenic diketones and aromatic diamines are used as a route to the formation of high molecular weight polyenamine ketones which exhibit good mechanical properties and can be cast into creasible films. Typical polymerization conditions involved the reaction of stoichiometric amounts of 1,4- or 1,3-PPPO and a diamine at 60 to 130 C in m-cresol at (w/w) solids content of 8 to 26 percent for a specified period of time under a nitrogen atmosphere. Novel polyenamine ketones were prepared with inherent viscosities as high as 1.99 dl/g and tough, clear amber films with tensile strengths of 12,400 psi and tensile moduli of 397,000 psi were cast from solutions of the polymers in chloroform.

Official Gazette of the U.S. Patent and Trademark Office

N89-13496*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
LOW DIELECTRIC FLUORINATED POLY(PHENYLENE ETHERE KEYTONE) FILM AND COATING Patent Application
PATRICK E. CASSIDY, inventor (to NASA), GORDON L. TULLOS, inventor (to NASA) (Southwest Texas State Univ., San Marcos.), and ANNE K. STCLAIR, inventor (to NASA) 23 Sep. 1988 16 p
(NASA-CASE-LAR-13992-1-CU; NAS 1.71:LAR-13992-1-CU; US-PATENT-APPL-SN-248009) Avail: NTIS HC A03/MF A01 CSCL 07A

The present invention relates to film and coating materials prepared from novel fluorinated poly(phenylene ether ketones). A fluorinated poly(phenylene ether ketone) is prepared by reacting a bisphenol with 1,1,1,3,3,3-hexafluoro-2,2-bis 4-(4-halobenzoyl) phenyl propane (wherein halo is fluoro or chloro), which is a novel monomer formed as the reaction product of halobenzene (wherein halo is fluoro or chloro) and 1,1,1,3,3,3-hexafluoro-2,2-bis (p-chloro formyl phenyl) propane. Especially beneficial results of this invention are that films and coating materials prepared from the novel fluorinated poly(phenylene ether ketone) are essentially optically transparent/colorless and have a lower dielectric constant than otherwise comparable, commercially available poly(phenylene ether ether ketones). Moreover, unlike the otherwise comparable commercially available materials, the novel fluorinated poly(phenylene ether ketones) of the present invention can be solution cast or sprayed to produce the films and coatings. Furthermore, the long term thermal stability of the polymers of the present invention is superior to that of the commercially available materials.

NASA

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COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

N89-14258*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
METHOD OF INSETTING PREDESIGNED DISBOND AREAS INTO COMPOSITE LAMINATES Patent Application
GEORGE E. DICKERSON, inventor (to NASA) 23 Sep. 1988 6 p
(NASA-CASE-LAR-13225-1; NAS 1.71:LAR-13225-1; US-PATENT-APPL-SN-248018) Avail: NTIS HC A02/MF A01 CSCL 11D

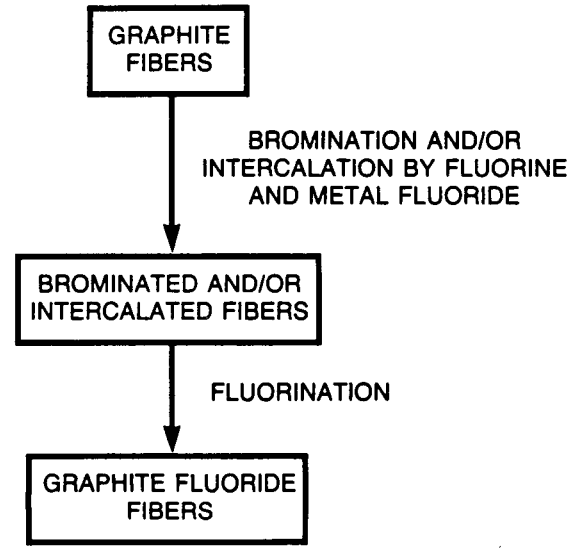
This invention is a process for producing composite laminates containing interlaminar disbonds of controlled sizes, shapes, and positions within a composite structure. A composite layer is provided for later inclusion within a laminate. The surfaces of this composite layer are solvent cleaned and sandblasted, except in desired disbond areas, which are coated with a releasing surface. A template to mask the bond areas is employed to obtain disbond areas of controlled shapes and sizes. The resulting composite layer is then used in the subsequent manufacture of a laminate, whereby faulty adhesion in the laminate can be studied with prior knowledge of the size, shape, and location of the disbond areas.

NASA

N89-14259*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
GRAPHITE FLUORIDE FIBER POLYMER COMPOSITE MATERIAL Patent Application
CHING-CHEH HUNG, inventor (to NASA) 30 Sep. 1988 10 p
(NASA-CASE-LEW-14472-1; NAS 1.71:LEW-14472-1; US-PATENT-APPL-SN-251499) Avail: NTIS HC A02/MF A01 CSCL 11D

Improved graphite fluoride fibers are produced by contact reaction between highly graphitized fibers and fluorine gas. It is preferable to intercalate the fibers with bromine or fluorine and metal fluoride prior to fluorination. These graphite fluoride fibers are bound by an epoxy. The resulting composites have high thermal conductivity, high electric resistivity, and high emissivity.

NASA



26

METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N89-14303* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
CASTABLE HOT CORROSION RESISTANT ALLOY Patent
CHARLES A. BARRETT, inventor (to NASA) and WILLIAM H. HOLT, inventor (to NASA) 25 Oct. 1988 6 p Continuation-in-part of US-Patent-Appl-SN-890584, filed 30 Jul. 1986
(NASA-CASE-LEW-14134-2; US-PATENT-4,780,276; US-PATENT-APPL-SN-108331; US-PATENT-CLASS-420-54; US-PATENT-CLASS-420-62; US-PATENT-CLASS-420-79; US-PATENT-CLASS-420-80; US-PATENT-CLASS-420-81) Avail: U.S. Patent and Trademark Office CSCL 11F

Some 10 wt percent nickel is added to an Fe-base alloy which has a ferrite microstructure to improve the high temperature castability and crack resistance while about 0.2 wt percent zirconium is added for improved high temperatur cyclic oxidation and corrosion resistance. The basic material is a high temperature

FeCrAl heater alloy, and the addition provides a material suitable for burner rig nozzles.

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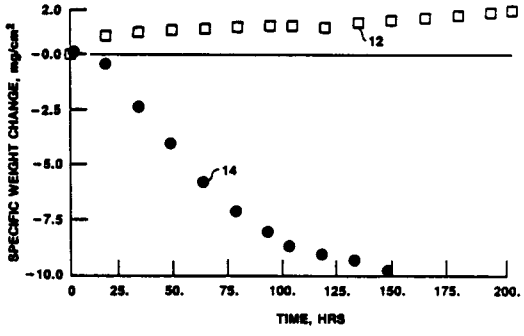

27

NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N89-12741* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
CRYOGENIC INSULATION SYSTEM Patent
RANDALL C. DAVIS, inventor (to NASA), ALLAN H. TAYLOR, inventor (to NASA), L. ROBERT JACKSON, inventor (to NASA), and PATRICK S. MCAULIFFE, inventor (to NASA) (Lockheed-California Co., Burbank.) 27 Sep. 1988 8 p Filed 10 Jun. 1987 Supersedes N87-25478 (25 - 19, p 2598)
(NASA-CASE-LAR-13506-1; US-PATENT-4,774,118; US-PATENT-APPL-SN-060182; US-PATENT-CLASS-428-71; US-PATENT-CLASS-156-297; US-PATENT-CLASS-156-299; US-PATENT-CLASS-428-44; US-PATENT-CLASS-428-47; US-PATENT-CLASS-428-58; US-PATENT-CLASS-428-76) Avail: US Patent and Trademark Office CSCL 11C

This invention relates to reusable, low density, high temperature cryogenic foam insulation systems and the process for their manufacture. A pacing technology for liquid hydrogen fueled, high speed aircraft is the development of a fully reusable, flight weight cryogenic insulation system for propellant tank structures. In the invention cryogenic foam insulation is adhesively bonded to the outer wall of the fuel tank structure. The cryogenic insulation consists of square sheets fabricated from an array of abutting square blocks. Each block consists of a sheet of glass cloth adhesively bonded between two layers of polymethacrylimide foam. Each block is wrapped in a vapor impermeable membrane, such as Kapton(R) aluminum Kapton(R), to provide a vapor barrier. Very beneficial results can be obtained by employing the present invention in conjunction with fibrous insulation and an outer aeroshell, a hot fuselage structure with an internal thermal protection system.

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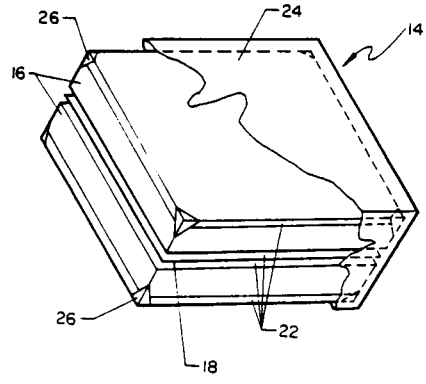

N89-13620*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
LIGHTWEIGHT CERAMIC INSULATION AND METHOD Patent Application
DAVID J. GREEN, inventor (to NASA) (Rockwell International Corp., Houston, Tex.) 30 Jun. 1988 8 p
(NASA-CASE-MSC-20782-1; NAS 1.71:MSC-20782-1; US-PATENT-APPL-SN-213392) Avail: NTIS HC A02/MF A01 CSCL 11C

The invention relates to a lightweight, high temperature resistant insulation and a process for making it. The insulation can be used in ceramic or metallurgical industrial applications which require high temperature insulation as well as the aerospace field for space vehicle insulation. This invention is for a freeze-dried powder which can be formed into low density, ceramic insulation and the process for making the powder. Water soluble salts are used which after heating or chemical conversion can be become high temperature ceramic. The salt solution is about 75 percent to about 99.5 percent water. The solution containing the salts is sprayed into a cryogenic liquid. The rapid freezing of the relatively dilute salt solution produces a solid with a fine microstructure. The frozen solids are placed in a vacuum chamber and freeze dried to remove the ice. The resultant solid is a powder containing porous aggregates. The relative percentage of water will control the solids in the aggregates. The porous powder is formed using casting or molding techniques. The pressing process is controlled to achieve the desired final density.

NASA

N89-14337* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
POLYPHENYLQUINOXALINES CONTAINING ALKYLENEDIOXY GROUPS Patent
PAUL M. HERGENROTHER, inventor (to NASA), STEPHEN J. HAVENS, inventor (to NASA), and FRANK W. HARRIS, inventor (to NASA) (Akron Univ., OH.) 29 Nov. 1988 8 p Filed 23 Mar. 1987 Supersedes N87-25475 (25 - 19, p 2598)
(NASA-CASE-LAR-13601-1-CU; US-PATENT-4,788,271; US-PATENT-APPL-SN-028831; US-PATENT-CLASS-528-125; US-PATENT-CLASS-528-128) Avail: U.S. Patent and Trademark Office CSCL 11B

Polyphenylquinoxalines were prepared from the reaction of bis(alpha-diketones) with aromatic bis(ortho-diamines). These polyphenylquinoxalines have lower glass transition temperatures and melt viscosities and consequently better processability than known polyphenylquinoxalines. The properties of these polyphenylquinoxalines (tensile strength, modulus, elongation, adhesive strength, fracture energy, and solvent resistance) are

comparable with the properties of known polyphenylquinoxalines.
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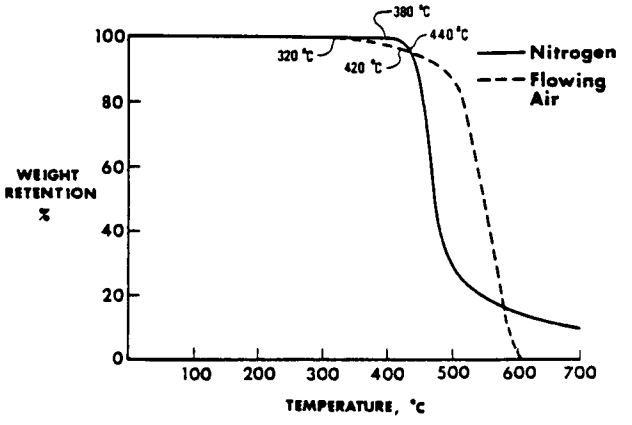

N89-16042* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
FIRE AND HEAT RESISTANT LAMINATING RESIN BASED ON MALEIMIDO AND CITRACONIMIDO SUBSTITUTED 1-(DIORGANOOXYPHOSPHONYL-METHYL)-2,4- AND -2,6-DIAMINOBENZENES Patent
JAMES M. BEGGS, inventor (to NASA), JOHN A. MIKROYANNIDIS, inventor (to NASA), and DEMETRIUS A. KOURTIDES, inventor (to NASA) (National Academy of Sciences - National Research Council, Washington, DC.) 4 Oct. 1988 10 p
(NASA-CASE-ARC-11533-2; US-PATENT-4,775,740; US-PATENT-APPL-SN-852461; US-PATENT-CLASS-528-321; US-PATENT-CLASS-528-72; US-PATENT-CLASS-528-73; US-PATENT-CLASS-528-220; US-PATENT-CLASS-528-228; US-PATENT-CLASS-528-322; US-PATENT-CLASS-528-353)
Avail: US Patent and Trademark Office CSCL 07C

The subject invention pertains to a novel class of fire-and heat-resistant bisimide resins prepared by thermal polymerization of maleimido or citraconimido substituted 1-(dialkoxyphosonyl)-methyl-2-4 and -2,6-diaminobenzenes. Typical polymer precursors have the chemical structure wherein R is alkyl, substituted alkyl or aryl, and R sup 1 is hydrogen or lower alkyl. The polymer precursors are prepared by reacting 1-(diorganooxyphosphonyl)methyl-2-4 and -2,6-diaminobenzenes with maleic anhydride or citraconic anhydride in a mole ratio 1:2. Chains extension of the monomers is achieved by reacting the mono-N-maleimido derivatives of 1-(diorganooxyphosphonyl)-methyl-2,4 and -2,6-diaminobenzenes with aryl tetracarboxylic dianhydrides, such as benzophenone tetracarboxylic dianhydride, or aryl diisocyanates, such as methylenebis (4-phenylisocyanate), in a mole ratio 2:1. The polymerization of the monomers is studied by differential scanning calorimetry (DSC) and the thermal stability of the polymers is ascertained by thermogravimetric analysis (TGA).
Official Gazette of the U.S. Patent and Trademark Office

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ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

N89-12785* National Aeronautics and Space Administration. Pasadena Office, CA.
SELF-ACTUATING HEAT SWITCHES FOR REDUNDANT REFRIGERATION SYSTEMS Patent
CHUNG K. CHAN, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 20 Sep. 1988 8 p Filed 20 Aug. 1987
(NASA-CASE-NPO-17085-1-CU; US-PATENT-4,771,823; US-PATENT-APPL-SN-087282; US-PATENT-CLASS-165-61; US-PATENT-CLASS-62-467; US-PATENT-CLASS-62-514-R; US-PATENT-CLASS-165-96) Avail: US Patent and Trademark Office CSCL 13B

A dual refrigeration system for cooling a sink device is described, which automatically thermally couples the cold refrigerator to the sink device while thermally isolating the warm refrigerator from the sink device. The system includes two gas gap heat switches that each thermally couples one of the refrigerators to the sink device, and a pair of sorption pumps that are coupled through tubes to the heat switches. When the first refrigerator is operated and therefore cold, the first pump which is thermally coupled to it is also cooled and adsorbs gas to withdraw it from the second heat switch, to thereby thermally isolate the sink device from the warm second refrigerator. With the second refrigerator being warm, the second pump is also warm and desorbs gas, so the gas lies in the first switch, to close that switch and therefore thermally couple the cold first refrigerator to the sink device. Thus, the heat switches are automatically switched according to the temperature of the corresponding refrigerator.
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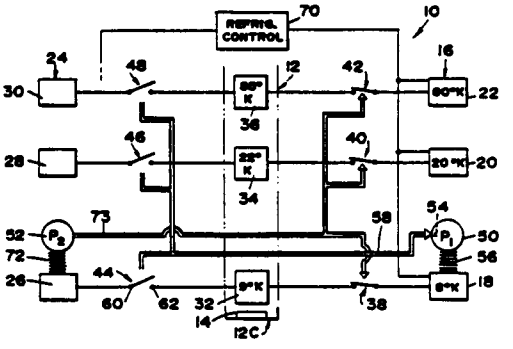

N89-12786* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
TRUSS-CORE CORRUGATION FOR COMPRESSIVE LOADS Patent
RANDALL C. DAVIS, inventor (to NASA) and ROBERT JACKSON, inventor (to NASA) 13 Sep. 1988 9 p Filed 5 Mar. 1987 Supersedes N87-25496 (25 - 19, p 2601)
(NASA-CASE-LAR-13438-1; US-PATENT-4,769,968; US-PATENT-APPL-SN-022298; US-PATENT-CLASS-52-814; US-PATENT-CLASS-52-821; US-PATENT-CLASS-428-182)
Avail: US Patent and Trademark Office CSCL 13B

A corrugated panel structure for supporting compressive loads is described which includes curved cap strips separated by truss-core web segments. The truss-core web segments are formed from first and second flat panels with a corrugated filler in between them. The corrugated filler extends in the direction of the compressive load. As a result, all components of the panel structure have a compressive load carrying capability resulting in a high strength-to-weight ratio when the compressive load is limiting. Application to rocket and aircraft structures is suggested.

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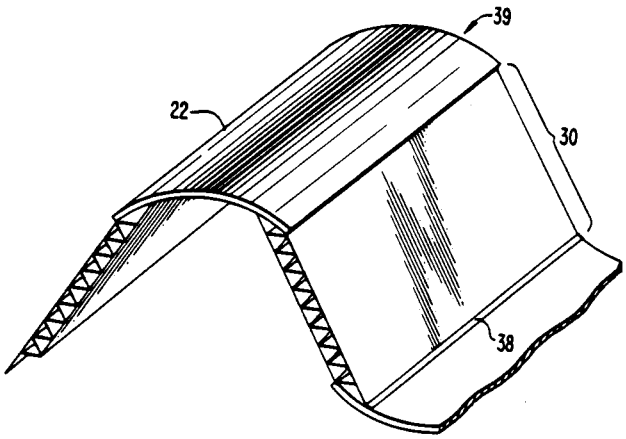


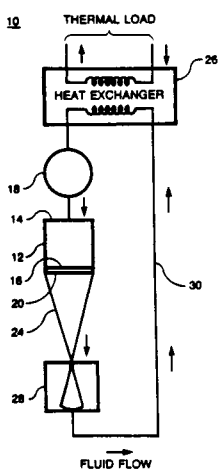
N89-14348*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

LIQUID SHEET RADIATOR APPARATUS Patent Application

DONALD L. CHUBB, inventor (to NASA) 15 Sep. 1988 14 p (NASA-CASE-LEW-14295-1; NAS 1.71:LEW-14295-1; US-PATENT-APPL-SN-244377) Avail: NTIS HC A03/MF A01 CSCL 13B

An external flow, liquid sheet radiator apparatus adapted for space applications has as its radiating surface a thin stable liquid sheet formed by fluid flow through a very narrow slit affixed to the sheet generator.

NASA



N89-14351* National Aeronautics and Space Administration. Pasadena Office, CA.

JOULE THOMSON REFRIGERATOR Patent

CHUNG K. CHAN, inventor (to NASA) and JOHN R. GATEWOOD, inventor (to NASA) 25 Oct. 1988 7 p (NASA-CASE-NPO-17143-1-CU; US-PATENT-4,779,428; US-PATENT-APPL-SN-105847; US-PATENT-CLASS-62-467; US-PATENT-CLASS-62-514-JT) Avail: US Patent and Trademark Office CSCL 13B

A bi-directional Joule Thomson refrigerator is described, which is of simple construction at the cold end of the refrigerator. Compressed gas flowing in either direction through the Joule Thomson expander valve and becoming liquid, is captured in a container in direct continuous contact with the heat load. The Joule Thomson valve is responsive to the temperature of the working fluid near the valve, to vary the flow resistance through the valve so as to maintain a generally constant flow mass between the time that the refrigerator is first turned on and the fluid is warm, and the time when the refrigerator is near its coldest temperature and the fluid is cold. The valve is operated by differences in thermal coefficients of expansion of materials to squeeze and release a small tube which acts as the expander valve.

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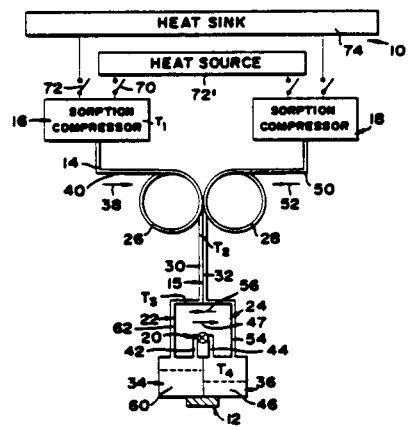

32

COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications.

N89-11961* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

SWITCHED STEERABLE MULTIPLE BEAM ANTENNA SYSTEM Patent

RICHARD S. IWASAKI, inventor (to NASA) (Axiomatix, Los Angeles, Calif.) 20 Sep. 1988 15 p Filed 10 Jun. 1987 Supersedes N87-29718 (25 - 24, p 3301) (NASA-CASE-MSC-20873-1-SB; US-PATENT-4,772,893; US-PATENT-APPL-SN-060196; US-PATENT-CLASS-343-779; US-PATENT-CLASS-343-777; US-PATENT-CLASS-343-778; US-PATENT-CLASS-342-374; US-PATENT-CLASS-342-375) Avail: US Patent and Trademark Office CSCL 20N

A steerable multibeam five element cross-feed cluster antenna system is described. The feed power is divided into five branches. Each branch includes a switching network comprised of a plurality of time delay elements each individually controlled by a respective electromagnetic latching switch. Frequency independent individual two-dimensional beam steering at intermediate (IF) scanning frequencies is thereby provided wherein discrete incremental time delays are introduced by the switching networks into each branch and the signals recombined thereafter to form each beam. The

electromagnetic latched switching reduces power consumption and permits higher power switching and reciprocal coincident tranmsit and receive operation. Frequency independence due to incremental time delay switching permits coincident reciprocal operation and steering for transmit-receive signal paths carrying different transmit-receive frequencies. Diagonal quarter wave plates in the waveguides alter polarization from the circular to orthogonal linear to provide transmitter-receiver isolation.

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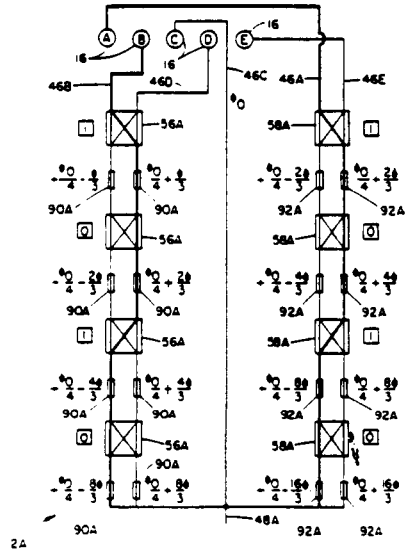

N89-14374* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

LEGISLATED EMERGENCY LOCATING TRANSMITTERS AND EMERGENCY POSITION INDICATING RADIO BEACONS Patent

WILLIAM R. WADE, inventor (to NASA) 11 Oct. 1988 12 p Filed 28 Sep. 1984 Supersedes N85-20226 (23 - 11, p 1624) (NASA-CASE-GSC-12892-1; US-PATENT-4,777,656; US-PATENT-APPL-SN-655606; US-PATENT-CLASS-455-98; US-PATENT-CLASS-455-67; US-PATENT-CLASS-455-115; US-PATENT-CLASS-455-117) Avail: US Patent and Trademark Office CSCL 09A

An emergency locating transmitting (ELT) system is disclosed which comprises a legislated ELT modified with an interface unit and connected by a multiwire cable to a remote control monitor (RCM), typically located at the pilot position. The RCM can remotely test the ELT by disabling the legislated swept tone and allowing transmission of a single tone, turn the ELT on for legislated ELT transmission, and reset the ELT to an armed condition. The RCM also provides visual and audio indications of transmitter operating condition as well as ELT battery condition. Removing the RCM or shorting or opening the interface input connections will not affect traditional ELT operation.

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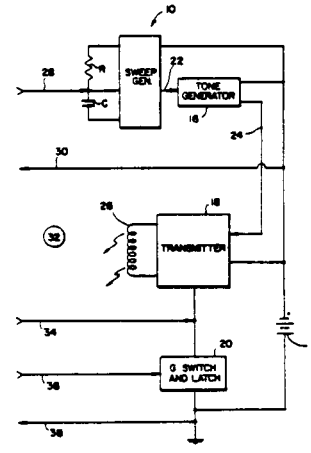

33

ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

N89-14384* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

LASER DOPPLER VELOCIMETER MULTIPLEXER INTERFACE FOR SIMULTANEOUS MEASURED EVENTS Patent

DEAN R. HARRISON, inventor (to NASA) and JAMES L. BROWN, inventor (to NASA) 18 Oct. 1988 24 p Filed 22 Apr. 1985 Supersedes N85-30202 (23 - 19, p 3258) (NASA-CASE-ARC-11536-1; US-PATENT-4,779,222; US-PATENT-APPL-SN-725714; US-PATENT-CLASS-364-900; US-PATENT-CLASS-356-28.5; US-PATENT-CLASS-342-195) Avail: US Patent and Trademark Office CSCL 09A

A laser Doppler velocimeter multiplexer interface includes an event pulse synchronizer which synchronizes data pulses from events A, B, and C. Clock control is connected to receive timing information on the data pulses from the synchronizer. Displays are connected to receive clock signals from the clock control for indicating a data rate for each of the measured events A, B, and C. The display is connected to receive clock signals from the clock control to indicate a coincidence rate between data pulses for any selected combination of the measured events A, B, and C. A multiplexer receives the data pulses from the events A, B, and C and rate data from the clock control. The multiplexer has output for supplying the data pulses and rate data to a single input of a data processing system. A multiplexer control is connected to supply control signals to the multiplexer for selecting the event data pulses and the rate data for output from the multiplexer. The multiplexer control receives start signals from the pulse synchronizer and user selected inputs for desired outputs

from the multiplexer.

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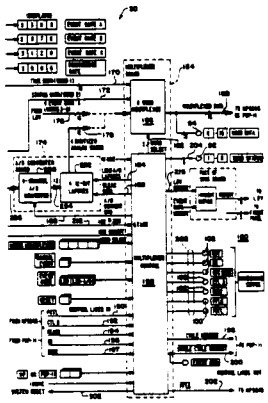

N89-14385* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

FREQUENCY DOMAIN LASER VELOCIMETER SIGNAL PROCESSOR Patent

JAMES F. MEYERS, inventor (to NASA), JOHN W. STOUGHTON, inventor (to NASA), JAMES I. CLEMMONS, JR., inventor (to NASA), SHARAD V. KANETKAR, inventor (to NASA), and ANDREAS E. SAVAKIS, inventor (to NASA) (Old Dominion Univ., Norfolk, Va.) 22 Nov. 1988 12 p Filed 24 Nov. 1986 Supersedes N87-18761 (25 - 11, p 1474)

(NASA-CASE-LAR-13552-1-CU; US-PATENT-4,786,168; US-PATENT-APPL-SN-933941; US-PATENT-CLASS-356-28.5; US-PATENT-CLASS-324-77-R; US-PATENT-CLASS-324-77-E; US-PATENT-CLASS-324-78-D; US-PATENT-CLASS-324-78-F; US-PATENT-CLASS-364-484; US-PATENT-CLASS-377-39)

Avail: U.S. Patent and Trademark Office CSCL 09A

A laser velocimeter signal processor for measuring the signal frequency within a signal burst was invented. The input signal is converted to digital by an analog to digital converter and then shifted into shift registers. An automatic gain circuit controls the gain of the input signal. A signal integration circuit determines when a signal burst has been captured by the shift registers and then transfers the contents of the registers to data latches. The data in the data latches is processed by digital bandpass filters, square law detectors, burst counters and a signal processor to determine the frequency of the signal within the captured signal burst.

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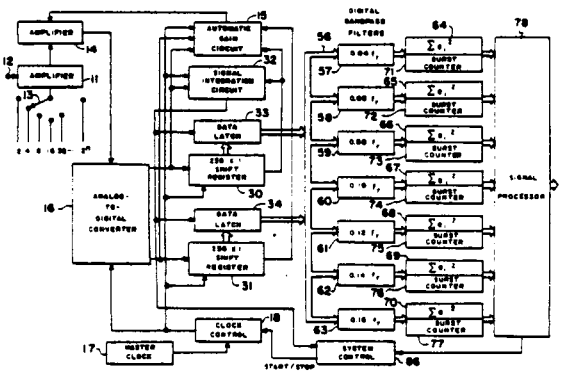


34

FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

N89-13728*# National Aeronautics and Space Administration. Pasadena Office, CA.

MULTI-ELEMENT SPHERICAL SHELL GENERATION Patent Application

ANDREW D. MORRISON, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 29 Aug. 1988 15 p (Contract NAS7-918)

(NASA-CASE-NPO-17203-1-CU; NAS 1.71:NPO-17203-1-CU; US-PATENT-APPL-SN-250195) Avail: NTIS HC A03/MF A01 CSCL 20D

A nozzle assembly in a multi-element spherical shell generation system includes first and second side-by-side spaced apart nozzles and a web portion extending between and connecting the nozzles. The first nozzle has an inner orifice adapted to discharge a first filler material and an outer annular orifice separated from and defined in concentric relation about the inner orifice and adapted to discharge a first shell material. The second nozzle has an inner orifice adapted to discharge a second filler material and an outer annular orifice separated from and defined in concentric relation about the inner orifice and adapted to discharge a second shell material. A multi-element spherical shell can be formed through employment of the nozzle assembly by merger with one another after discharge from the outer orifices of the nozzles of a pair of adjacent annular streams of liquid or molten shell wall material of different compositions and encapsulation by the mixed shell wall materials of a common encapsulated core fluids also simultaneously discharged by the inner orifices nozzles. On the other hand, the pair of encapsulating streams of shell wall material can be of the same materials which merge together and encapsulate core fluids of different compositions which will merge together after discharge from the nozzles.

NASA

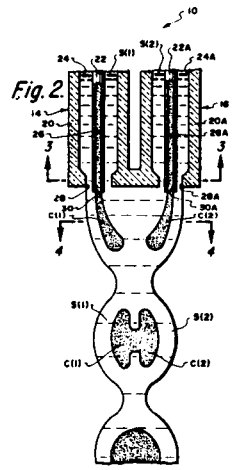


Fig. 2

N89-14392* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

CAPILLARY HEAT TRANSPORT AND FLUID MANAGEMENT DEVICE Patent

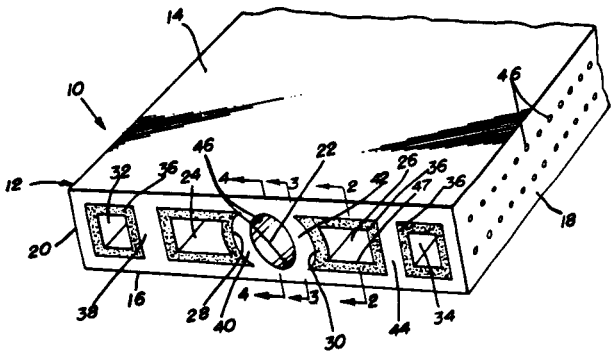
JAMES W. OWEN, inventor (to NASA) 13 Sep. 1988 9 p Filed 30 Jun. 1987 Supersedes N87-29769 (25 - 24, p 3309)

(NASA-CASE-MFS-28217-1; US-PATENT-4,770,238; US-PATENT-APPL-SN-067844; US-PATENT-CLASS-165-104.26;

US-PATENT-CLASS-165-104.14; US-PATENT-CLASS-122-366)
Avail: US Patent and Trademark Office CSCL 20D

A passive heat transporting and fluid management apparatus including a housing in the form of an extruded body member having flat upper and lower surfaces is disclosed. A main liquid channel and at least two vapor channels extend longitudinally through the housing from a heat input end to a heat output end. The vapor channels have sintered powdered metal fused about the peripheries to form a porous capillary wick structure. A substantial number of liquid arteries extend transversely through the wicks adjacent the respective upper and lower surfaces of the housing, the arteries extending through the wall of the housing between the vapor channels and the main liquid channel and open into the main liquid channel. Liquid from the main channel enters the artery at the heat input end, wets the wick and is vaporized. When the vapor is cooled at the heat output end, the condensed vapor refills the wick and the liquid reenters the main liquid channel.

Official Gazette of the U.S. Patent and Trademark Office



35

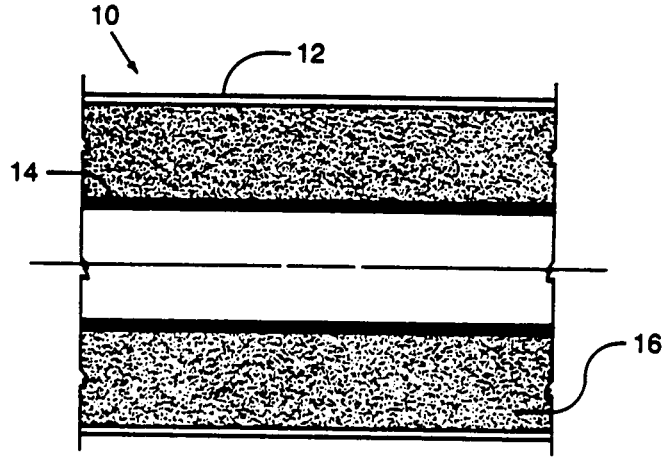
INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

N89-12048* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
GAS PARTICLE RADIATOR Patent
DONALD L. CHUBB, inventor (to NASA) 13 Sep. 1988 5 p
Filed 9 Oct. 1986 Supersedes N87-15452 (25 - 07, p 905)
(NASA-CASE-LEW-14297-1; US-PATENT-4,770,232;
US-PATENT-APPL-SN-917125; US-PATENT-CLASS-165-41;
US-PATENT-CLASS-165-904; US-PATENT-CLASS-126-443;
US-PATENT-CLASS-126-901) Avail: US Patent and Trademark Office CSCL 14B

A gas particle radiator adapted to operate in a microgravity space environment having a transparent boundary which transmits energy in the infrared spectrum, and a gas particle mixture that yields high absorption and emittances are described.

Official Gazette of the U.S. Patent and Trademark Office



N89-12841* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
POROUS PLUG FOR REDUCING ORIFICE INDUCED PRESSURE ERROR IN AIRFOILS Patent
ELIZABETH B. PLENTOVICH, inventor (to NASA), BLAIR B. GLOSS, inventor (to NASA), JOHN W. EVES, inventor (to NASA), and JOHN P. STACK, inventor (to NASA) 13 Sep. 1988 8 p
Filed 5 Feb. 1987 Supersedes N87-25559 (25 - 19, p 2612)
(NASA-CASE-LAR-13569-1; US-PATENT-4,770,032;
US-PATENT-APPL-SN-010943; US-PATENT-CLASS-73-147;
US-PATENT-CLASS-73-180) Avail: US Patent and Trademark Office CSCL 14B

A porous plug is provided for the reduction or elimination of positive error caused by the orifice during static pressure measurements of airfoils. The porous plug is press fitted into the orifice, thereby preventing the error caused either by fluid flow turning into the exposed orifice or by the fluid flow stagnating at the downstream edge of the orifice. In addition, the porous plug is made flush with the outer surface of the airfoil, by filing and polishing, to provide a smooth surface which alleviates the error caused by imperfections in the orifice. The porous plug is preferably made of sintered metal, which allows air to pass through the pores, so that the static pressure measurements can be made by remote transducers.

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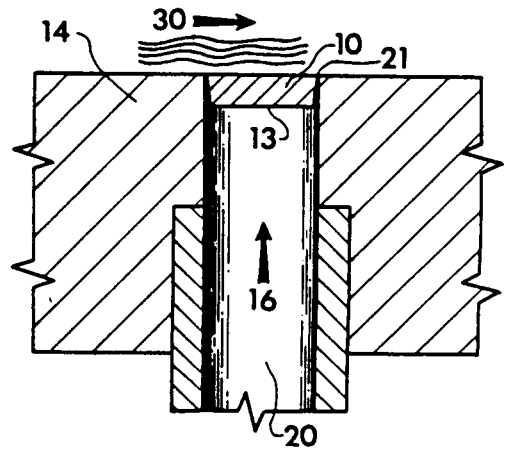
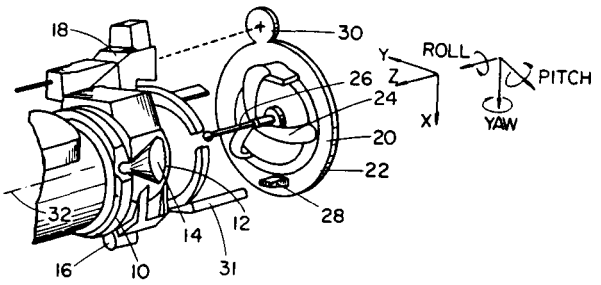


N89-12842*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
IMPROVED DOCKING ALIGNMENT SYSTEM Patent Application
LEO G. MONFORD, inventor (to NASA) 15 Sep. 1988 19 p
(NASA-CASE-MSC-21372-1; NAS 1.71:MSC-21372-1;
US-PATENT-APPL-SN-246595) Avail: NTIS HC A03/MF A01
CSCL 14B

Improved techniques are provided for the alignment of two objects. The present invention is particularly suited for 3-D translation and 3-D rotational alignment of objects in outer space. A camera is affixed to one object, such as a remote manipulator arm of the spacecraft, while the planar reflective surface is affixed to the other object, such as a grapple fixture. A monitor displays in real-time images from the camera such that the monitor displays both the reflected image of the camera and visible marking on the planar reflective surface when the objects are in proper alignment. The monitor may thus be viewed by the operator and the arm manipulated so that the reflective surface is perpendicular to the optical axis of the camera, the roll of the reflective surface is at a selected angle with respect to the camera, and the camera is spaced a pre-selected distance from the reflective surface.

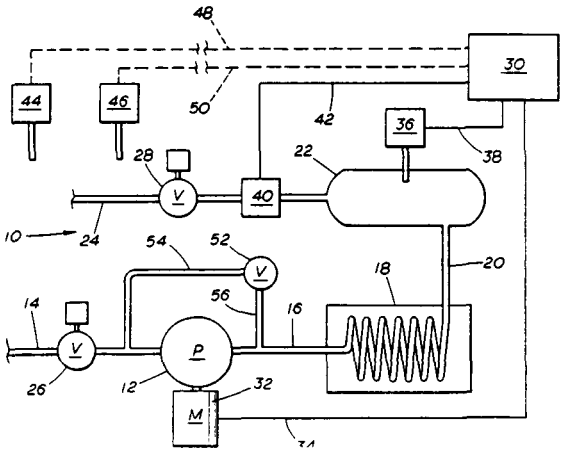
NASA



N89-12843*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
TANK GAUGING APPARATUS AND METHOD Patent Application
BRIAN G. MORRIS, inventor (to NASA) 11 Jul. 1988 22 p
(NASA-CASE-MSC-21059-1; NAS 1.71:MSC-21059-1;
US-PATENT-APPL-SN-217725) Avail: NTIS HC A03/MF A01
CSCL 14B

An apparatus for gauging the amount of liquid in a container of liquid and gas under low or zero gravity net conditions includes an accumulator and appropriate connector apparatus for communicating gas between the accumulator and the container. In one form of the invention, gas is removed from the container and compressed into the accumulator. The pressure and temperature of the fluid in the container is measured before and after removal of the gas; the pressure and temperature of the gas in the accumulator is measured before and after compression of the gas into the accumulator from the container. These pressure and temperature measurements are used to determine the volume of gas in the container, whereby the volume of the liquid in the container can be determined from the difference between the known volume of the container and the volume of gas in the container. Gas from the accumulator may be communicated into the container in a similar process as a verification of the gauging of the liquid volume, or as an independent process for determining the volume of liquid in the container.

NASA

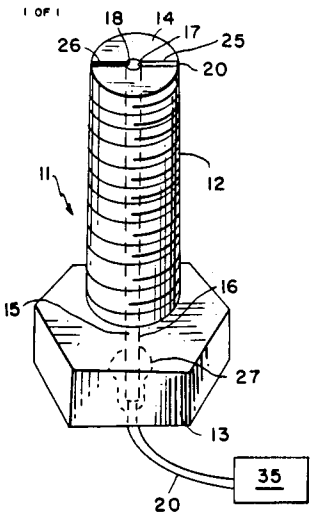


N89-13763*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
THREADED AVERAGE TEMPERATURE THERMOCOUPLE Patent Application
STANLEY W. WARD, inventor (to NASA) 15 Sep. 1988 8 p
(NASA-CASE-LAR-13475-1; NAS 1.71:LAR-13475-1;
US-PATENT-APPL-SN-244376) Avail: NTIS HC A02/MF A01
CSCL 14B

A threaded average temperature thermocouple is provided to measure the average temperature of a situs in a test material. A ceramic insulator rod with two parallel holes through its length is securely fitted in a cylinder, which is bored along the longitudinal axis of symmetry of a threaded bolt. This threaded bolt is composed of material having thermal properties similar to those of the test material. Leads of a thermocouple wire leading from a remotely situated temperature sensing device are each fed through one of the holes secured at the head end of the ceramic insulator rod, and exit at its tip end. Each lead of the thermocouple is bent into and secured in an opposite radial groove in the tip end of the threaded bolt. The resulting threaded average temperature thermocouple is ready to be inserted into a cylindrical receptacle. The tip end of the threaded average temperature thermocouple is

in intimate contact with its receptacle. A jam nut secures the threaded average temperature thermocouple to the test material.

NASA



N89-13764*# National Aeronautics and Space Administration. Pasadena Office, CA.

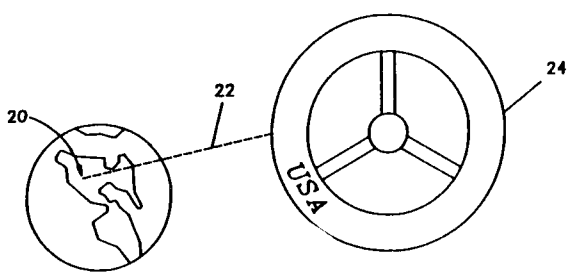
REMOTE OBJECT CONFIGURATION/ORIENTATION DETERMINATION Patent Application

LARRY L. SCHUMACHER, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 29 Aug. 1988 12 p (Contract NAS7-918)

(NASA-CASE-NPO-17436-1-CU; NAS 1.71:NPO-17436-1-CU; US-PATENT-APPL-SN-237035) Avail: NTIS HC A03/MF A01 CSCL 14B

This invention relates to object detection and location systems and, more particularly, to a method for determining the configuration and location of an object with respect to an X, Y, X coordinate frame. In space applications in particular, there is a need to be able to passively determine the orientation of an object at a distance, for example, in the control of large, flexible space structures. At present, there is no available method or apparatus which will allow the operator to make such a determination. A similar problem and need exists in robotic application. It is the primary object of this invention to provide a system for remotely defining an object's configuration in a manner compatible with a computer's analytical capability.

NASA



N89-14407* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

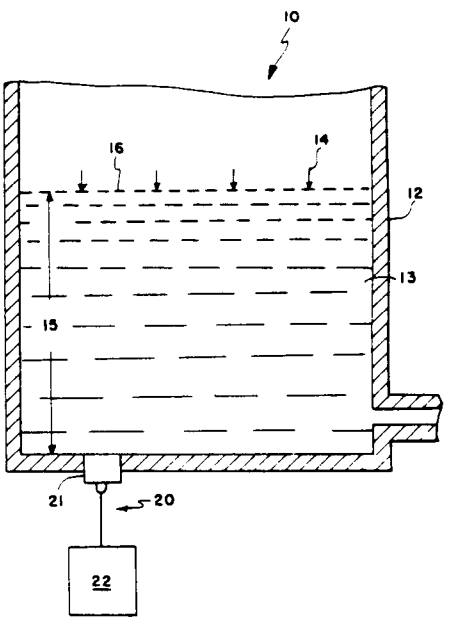
ULTRASONIC DEPTH GAUGE FOR LIQUIDS UNDER HIGH PRESSURE Patent

ALLAN J. ZUCKERWAR, inventor (to NASA) and DAVID S. MAZEL, inventor (to NASA) (Old Dominion Univ., Norfolk, Va.) 13 Sep. 1988 8 p Filed 13 Feb. 1986 Supersedes N86-32700 (24 - 24, p 3729)

(NASA-CASE-LAR-13300-1-CU; US-PATENT-4,770,038; US-PATENT-APPL-SN-829042; US-PATENT-CLASS-73-290-V; US-PATENT-CLASS-310-338; US-PATENT-CLASS-367-908) Avail: US Patent and Trademark Office CSCL 14B

The invention relates to an ultrasonic depth gauge for liquids under high pressure and is particularly useful in the space industry where it is necessary to use a pressurized gas to transfer a liquid from one location to another. Conventional liquid depth gauges do not have the capability to operate under extreme high pressure (i.e., exceeding 300 psi). An ultrasonic depth gauge capable of withstanding high pressure according to the present invention is comprised of a transducer assembly and a supporting electronics unit. The former is mounted in to the bottom wall of a storage vessel with its resonating surface directly exposed to the highly pressurized liquid in the vessel. In operation, the ultrasonic pulse propagates upward through the liquid to the liquid-gas interface in the storage vessel. When the ultrasonic echo returns from the liquid-gas interface, it re-excites the composite resonator into vibration. The supporting electronics unit measures the round-trip transmit time for the ultrasonic pulse and its return echo to traverse the depth of the highly pressurized liquid. The novelty of the invention resides in the use of a conventional transducer rigidly bonded to the inside wall of a bored out conventional high-pressure plug to form a composite resonator capable of withstanding extremely high pressure.

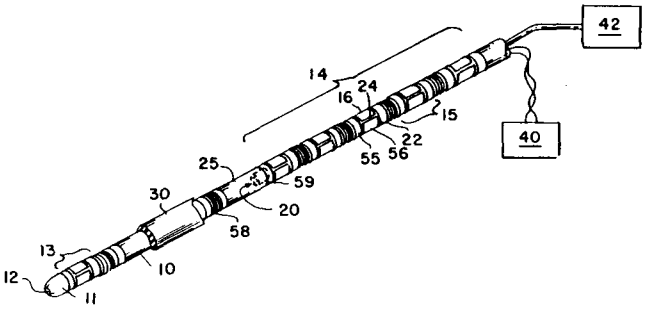
Official Gazette of the U.S. Patent and Trademark Office



N89-14408*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
CIRCUMFERENTIAL PRESSURE PROBE Patent Application
HARLAN K. HOLMES, inventor (to NASA), THOMAS C. MOORE, inventor (to NASA), and ANDREW J. FANTI, inventor (to NASA) 23 Sep. 1988 13 p
(NASA-CASE-LAR-13775-1; NAS 1.71:LAR-13775-1; US-PATENT-APPL-SN-248020) Avail: NTIS HC A03/MF A01 CSCL 14B

A probe for measuring circumferential pressure inside a body cavity is disclosed. In the preferred embodiment, a urodynamic pressure measurement probe for evaluating human urinary sphincter function is disclosed. Along the length of the probe are disposed a multiplicity of deformable wall sensors which typically comprise support tube sections with flexible side wall areas. These are arranged along the length of the probe in two areas, one just proximal to the tip for the sensing of fluid pressure inside the bladder, and five in the sensing section which is positioned within the urethra at the point at which the urinary sphincter constricts to control the flow of urine. The remainder of the length of the probe comprises multiple rigid support tube sections interspersed with flexible support tube sections in the form of bellows to provide flexibility.

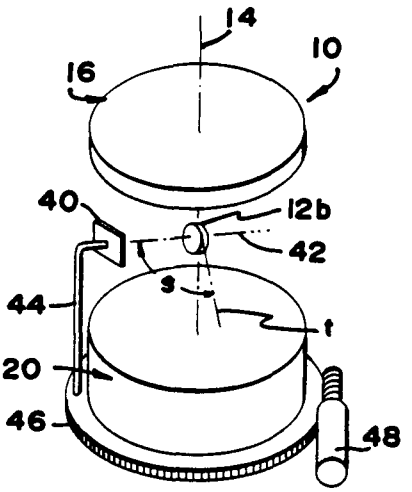
NASA



N89-14422* National Aeronautics and Space Administration. Pasadena Office, CA.
CONTROLLED SAMPLE ORIENTATION AND ROTATION IN AN ACOUSTIC LEVITATOR Patent
MARTIN B. BARMATZ, inventor (to NASA), MARK S. GASPAR, inventor (to NASA), and EUGENE H. TRINH, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 18 Oct. 1988 9 p
(NASA-CASE-NPO-17086-1-CU; US-PATENT-4,777,823; US-PATENT-APPL-SN-087359; US-PATENT-CLASS-73-505) Avail: U.S. Patent and Trademark Office CSCL 14B

A system is described for use with acoustic levitators, which can prevent rotation of a levitated object or control its orientation and/or rotation. The acoustic field is made nonsymmetrical about the axis of the levitator, to produce an orienting torque that resists sample rotation. In one system, a perturbating reflector is located on one side of the axis of the levitator, at a location near the levitated object. In another system, the main reflector surface towards which incoming acoustic waves are directed is nonsymmetrically curved about the axis of the levitator. The levitated object can be reoriented or rotated in a controlled manner by repositioning the reflector producing the nonsymmetry.

Official Gazette of the U.S. Patent and Trademark Office



N89-14423* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
PRESSURE MEASURING PROBE Patent
GEORGE C. ASHBY, JR., inventor (to NASA) 15 Nov. 1988 5 p Filed 13 Jan. 1988 Supersedes N88-23961 (26 - 17, p 2341)
(NASA-CASE-LAR-13853-1; US-PATENT-4,783,994; US-PATENT-APPL-SN-143436; US-PATENT-CLASS-73-147; US-PATENT-CLASS-73-861.65) Avail: U.S. Patent and Trademark Office CSCL 14B

The invention is a probe for measuring changes in pressure in a high velocity fluid stream over and adjacent to the surface of an object. The probe is formed of an exterior housing having a closed pressure chamber in which a piezoelectric pressure transducer is mounted. An open connector tube having a probe tip passes a portion of the fluid stream into the closed pressure chamber; any change of pressure within, which requires a settling-time to appear in the closed pressure chamber, is inversely proportional to the cross-sectional area of the connector tube. A cooling chamber formed around the pressure chamber is connected to a source of cooling fluid by means of inlet and outlet tubes.

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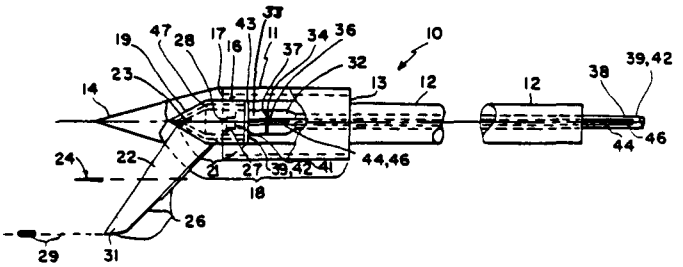

N89-15379* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
FLUIDIC MOMENTUM CONTROLLER Patent
RONALD S. MAYNARD, inventor (to NASA) 11 Oct. 1988 11 p Continuation of US-Patent-Appl-SN-779742, filed 24 Sep. 1985, abandoned
(NASA-CASE-MSC-20906-2; US-PATENT-4,776,541; US-PATENT-APPL-SN-021569; US-PATENT-CLASS-244-165; US-PATENT-CLASS-74-572; US-PATENT-CLASS-244-164)
Avail: US Patent and Trademark Office CSCL 14B

Large angular control moments and torques are developed by controllably circulating a relatively small mass of liquid through small diameter pipes describing a large diameter loop. The loop, by generating and storing angular momentum, can thereby provide efficient cancellation of periodic, non-accumulating, externally induced rotational disturbances. The loop is preferably located on or near the periphery of a structure which is to be stabilized.

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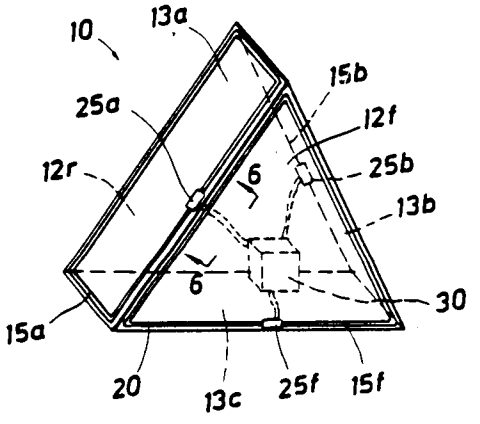


36

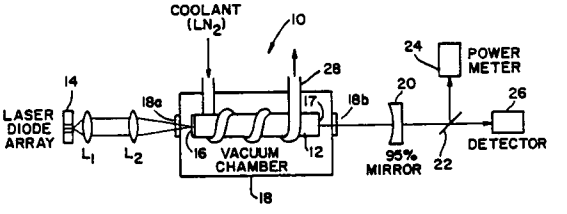
LASERS AND MASERS

Includes parametric amplifiers.

N89-12856*# National Aeronautics and Space Administration. Pasadena Office, CA.
TM,HO:YLF LASER END-PUMPED BY A SEMICONDUCTOR DIODE LASER ARRAY Patent Application
HAMID HEMMATI, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 23 Aug. 1988 16 p (Contract NAS7-918)
(NASA-CASE-NPO-17282-1-CU; NAS 1.71:NPO-17282-1-CU; US-PATENT-APPL-SN-235150) Avail: NTIS HC A03/MF A01 CSCL 20E

An Ho:YLF crystal including Tm as sensitizers for the activator Ho, is optically pumped with a semiconductor diode laser array to generate 2.1 micron radiation with a pump power to output power of efficiency as high as 68 percent. The prior-art dual sensitizer system of Er and Tm requires cooling, such as by LN2, but by using Tm alone and decreasing the concentrations of Tm and Ho, and decreasing the length of the laser rod to about 1 cm, it has been demonstrated that laser operation can be obtained from a temperature of 77 K with an efficiency as high as 68 percent up to ambient room temperature with an efficiency at that temperature as high as 9 percent.

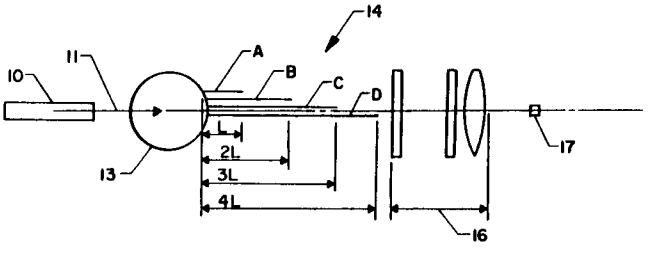
NASA



N89-14428*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
METHOD AND APPARATUS FOR REDUCING SPECKLE Patent Application
ISRAEL TABACK, inventor (to NASA) (Bionetics Corp., Hampton, VA.) 19 Jul. 1988 12 p
(NASA-CASE-LAR-13771-1; NAS 1.71:LAR-13771-1; US-PATENT-APPL-SN-221387) Avail: NTIS HC A03/MF A01 CSCL 20E

The invention is a method and apparatus for reducing speckle in an unmodulated laser pulse of a known coherence length by introducing a number (N) of independent time delays (TD) into the input pulse equal to the shorter of the coherence length of the laser input pulse source or the width of the delayed laser output pulses to reduce speckle in the combined laser output pulses by the function of the number N of independent time delays (TD).

NASA



37

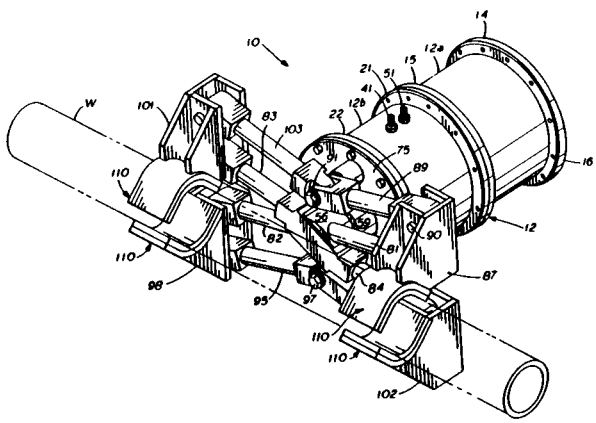
MECHANICAL ENGINEERING

Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

N89-12865*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
GRIPPING DEVICE Patent Application
GEORGE F. PARMA, inventor (to NASA) 19 Jul. 1988 21 p
(NASA-CASE-MSC-21365-1; NAS 1.71:MSC-21365-1;
US-PATENT-APPL-SN-221388) Avail: NTIS HC A03/MF A01
CSCL 13I

This invention relates to a gripping device, and more particularly to one with a large moment carrying capability for handling long workpieces of various diameters and which can be particularly used as an end effector on a robotic arm.

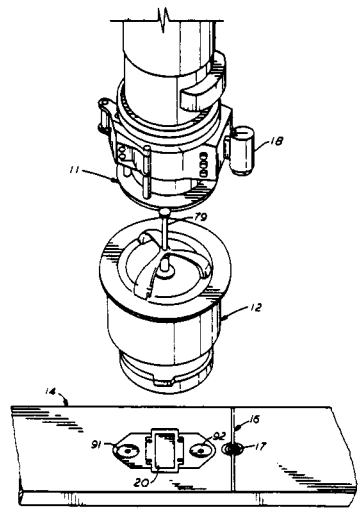
NASA



N89-12866*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
MAGNETIC ATTACHMENT MECHANISM Patent Application
MITCHELL B. WU, inventor (to NASA) and WILLIAM D. HARWELL, inventor (to NASA) 23 Sep. 1988 20 p
(NASA-CASE-MSC-21095-1; NAS 1.71:MSC-21095-1;
US-PATENT-APPL-SN-248010) Avail: NTIS HC A03/MF A01
CSCL 13I

A magnetic attachment mechanism adapted for interfacing with the manipulator arm of a remote manipulator system and comprising a pair of permanent magnets of rare earth material are arranged in a stator-rotor relationship. The rotor magnet is journalled for rotation about its longitudinal axis between pole plates of the stator magnet, each of which includes an adhering surface. In a first rotary position corresponding to the ON condition, each of the poles of the rotor magnet is closely adjacent to a stator magnet pole plate of like polarity whereby the respective magnet fields are additive for producing a strong magnetic field emanating from the adhering surfaces for attracting a ferrous magnetic plate, or the like, affixed to the payload. When the rotor magnet is rotated to a second position corresponding to the OFF condition, each of the poles of the rotor magnet is disposed closely adjacent to a pole plate of unlike polarity whereby the magnetic fields of the magnets are in cancelling relationship at the adhering surfaces, which permits the release of a payload. An actuator for selectively rotating the rotor magnet between the ON and OFF positions is provided for interfacing and connecting the magnetic attachment mechanism with a manipulator arm. For affecting an optimal rigidized attachment the payload is provided with guide means cooperable with guide means on the housing of the mechanism for directing adhering surfaces of the polar plates to the ferrous plate.

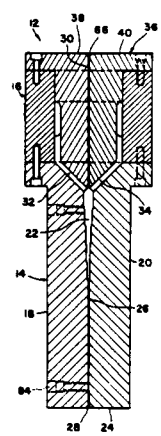
NASA



N89-12867*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
PULTRUSION DIE ASSEMBLY Patent Application
MAYWOOD L. WILSON, inventor (to NASA), GARY S. JOHNSON, inventor (to NASA), MARK W. FRYE, inventor (to NASA), and CLARENCE E. STANFIELD, inventor (to NASA) 1 Sep. 1988 20 p
(NASA-CASE-LAR-13719-1; NAS 1.71:LAR-13719-1;
US-PATENT-APPL-SN-239260) Avail: NTIS HC A03/MF A01
CSCL 13I

This invention relates generally to pultrusion die assemblies, and more particularly, to a pultrusion die assembly which incorporates a plurality of functions in order to produce a continuous, thin composite fiber reinforced thermoplastic material. The invention is useful for making high performance thermoplastic composite materials in sheets which can be coiled on a spool and stored for further processing.

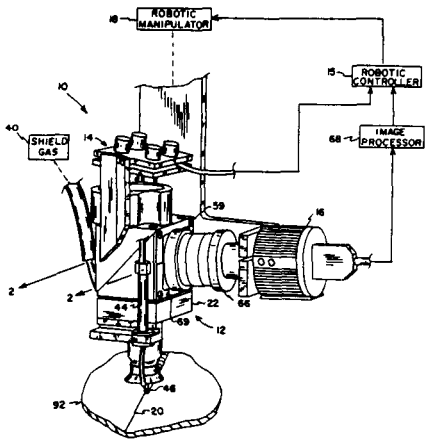
NASA



N89-12868*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
OPTICALLY CONTROLLED WELDING SYSTEM Patent Application
STEPHEN S. GORDON, inventor (to NASA) (Rockwell International Corp., Huntsville, Ala.) 28 Sep. 1988 16 p
(NASA-CASE-MFS-29291-1; NAS 1.71:MFS-29291-1; US-PATENT-APPL-SN-250196) Avail: NTIS HC A03/MF A01 CSCL 13H

An optically controlled welding system wherein a welding torch having through-the-torch viewing capabilities is provided with an optical beam splitter to create a transmitted view and a reflective view of a welding operation. These views are converted to digital signals which are then processed and utilized by a computerized robotic welder to make the welding torch responsive thereto. Other features include an actively cooled electrode holder which minimizes a blocked portion of the view by virtue of being constructed of a single spoke or arm, and a weld pool contour detector comprising a laser beam directed onto the weld pool with the position of specular radiation reflected therefrom, being characteristic of a penetrated or unpenetrated condition of the weld pool.

NASA



N89-13785* National Aeronautics and Space Administration. Pasadena Office, CA.
PASSIVELY ACTIVATED PREHENSILE DIGIT FOR A ROBOTIC END EFFECTOR Patent
EARL R. COLLINS, JR., inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 13 Sep. 1988 8 p Filed 21 Oct. 1986 Supersedes N87-14705 (25 - 06, p 781)
(NASA-CASE-NPO-16766-1-CU; US-PATENT-4,770,455; US-PATENT-APPL-SN-921577; US-PATENT-CLASS-294-88; US-PATENT-CLASS-194-902; US-PATENT-CLASS-269-267)
Avail: US Patent and Trademark Office CSCL 13I

A common hydraulic reservoir holds one or more rows of slidable pistons or fingers in a base or hand. The individual fingers in each row expose graduated cross sectional fluid application areas to the hydraulic fluid in the reservoir, with the smallest fluid application area in the center of the row and graduating to progressive larger fluid areas towards both ends of each row. The fingers are elongated pistons. Exposed outer ends of each piston extending away from the reservoir, house a transverse pad to contact an object to be held. The transverse pads are universally ball-joint and spring-center mounted in a longitudinally located opening at the outer tapered end of each finger. Simple and effective capacitance metering in the reservoir is provided for each finger.

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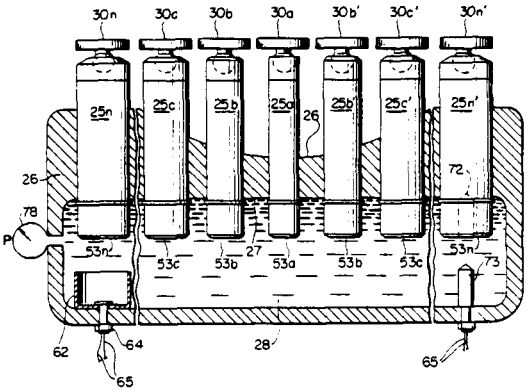

N89-13786* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, FL.
QUICK-DISCONNECT INFLATABLE SEAL ASSEMBLY Patent
KURT D. BUEHLER, inventor (to NASA) and JAMES E. FESMIRE, inventor (to NASA) 20 Sep. 1988 9 p Filed 22 May 1987 Supersedes N87-25583 (25 - 19, p 2616)
(NASA-CASE-KSC-11368-1; US-PATENT-4,772,050; US-PATENT-APPL-SN-052940; US-PATENT-CLASS-285-39; US-PATENT-CLASS-285-97; US-PATENT-CLASS-285-107; US-PATENT-CLASS-285-108; US-PATENT-CLASS-285-109; US-PATENT-CLASS-285-133.1; US-PATENT-CLASS-285-351)
Avail: US Patent and Trademark Office CSCL 13K

This invention concerns an inflatable seal assembly adapted for use with a bayonet quick-disconnect system particularly useful for the insulated transfer of cryogenic consumables in orbit (such as between a space station and a re-supply vehicle). The zero-leak cryogenic coupling includes a polymeric seal clamped to a male bayonet member with two pairs of tightening rings. The tightening rings threadably engage each other in respective pairs around tapered ends of the inflatable seal member so that a wedging action tightens the seal member about the male bayonet. Once in place, the seal may be inflated via an inflation port so that its expansion provides pressure contact with the inside surface of a coaxial female member.

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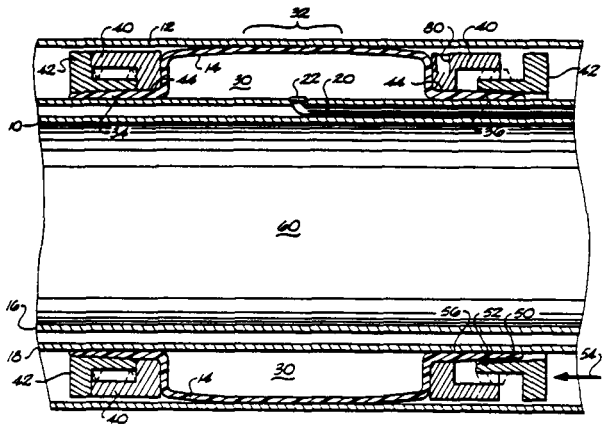
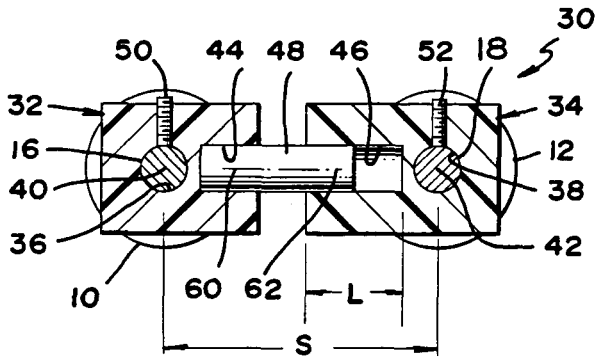


N89-13787*# National Aeronautics and Space Administration. Pasadena Office, CA.
ROTARY CONTROL LOCK Patent Application
TED H. TAKAHASHI, inventor (to NASA) and GREG C. LEVANAS,

inventor (to NASA) 23 Sep. 1988 11 p
(Contract NAS7-918)
(NASA-CASE-NPO-17453-1-CU; NAS 1.71:NPO-17453-1-CU; US-PATENT-APPL-SN-248501) Avail: NTIS HC A02/MF A01 CSCL 13K

The object of this invention is to provide a device that locks potentiometer shafts against rotation, to prevent tampering with the settings of unattended equipment. A major novel feature is a pair of blocks that can each be clamped to a rotary shaft, and a link connecting the blocks to prevent their rotation and therefore prevent rotation of the shafts.

NASA



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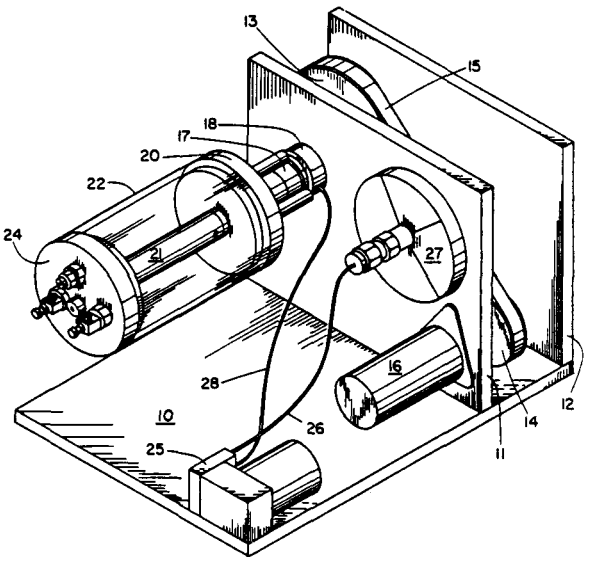
LIFE SCIENCES (GENERAL)

N89-13131*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
HORIZONTALLY ROTATED CELL CULTURE SYSTEM Patent Application
DAVID A. WOLF, inventor (to NASA), RAY SCHWARZ, inventor (to NASA), and TINH TRINH, inventor (to NASA) (Krug International, Houston, Tex.) 30 Jun. 1988 17 p
(NASA-CASE-MSC-21294-1; NAS 1.71:MSC-21294-1; US-PATENT-APPL-SN-213558) Avail: NTIS HC A03/MF A01 CSCL 06C

The present invention relates to a horizontally rotating bioreactor useful for carrying out cell and tissue culture. For processing of mammalian cells, the system is sterilized and fresh fluid medium, microcarrier beads, and cells are admitted to completely fill the cell culture vessel. An oxygen containing gas is admitted to the interior of the permeable membrane which prevents air bubbles from being introduced into the medium. The cylinder is rotated at a low speed within an incubator so that the circular motion of the fluid medium uniformly suspends the microbeads throughout the cylinder during the cell growth period. The unique design of this cell and tissue culture device was initially driven by two requirements imposed by its intended use for feasibility studies for three dimensional culture of living cells and tissues in space by JSC. They were compatibility with microgravity and simulation of microgravity in one G. The vessels are designed to approximate the extremely quiescent low shear environment obtainable in space.

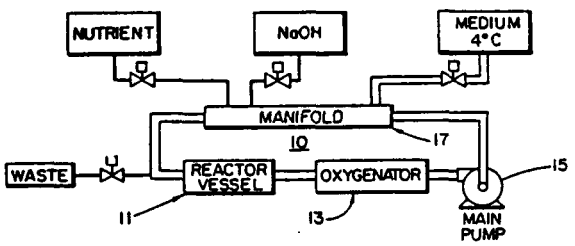
NASA



N89-14666*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
BIO-REACTOR CELL CULTURE PROCESS Patent Application
DAVID A. WOLF, inventor (to NASA) and RAY SCHWARZ, inventor (to NASA)(Krug International, Houston, TX.) 30 Jun. 1988 25 p
(NASA-CASE-MSC-21293-1; NAS 1.71:MSC-21293-1; US-PATENT-APPL-SN-213559) Avail: NTIS HC A03/MF A01 CSCL 06C

A bio-reactor system is described in which a tubular housing contains an internal circularly disposed set of blade members and a central tubular filter all mounted for rotation about a common horizontal axis and each having independent rotational support and rotational drive mechanisms. The housing, blade members and filter preferably are driven at a constant slow speed for placing a fluid culture medium with discrete microbeads and cell cultures in a discrete spatial suspension in the housing. Replacement fluid medium is symmetrically input and fluid medium is symmetrically output from the housing where the input and the output are part of a loop providing a constant or intermittent flow of fluid medium in a closed loop.

NASA



52

AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

N89-16256* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
VISUAL ACCOMMODATION TRAINER-TESTER Patent
ROBERT J. RANDLE, inventor (to NASA) 18 Oct. 1988 12 p Continuation-in-part of US-Patent-Appl-SN-526741, filed 26 Aug. 1983, abandoned
(NASA-CASE-ARC-11426-2; US-PATENT-4,778,268; US-PATENT-APPL-SN-827185; US-PATENT-CLASS-351-203; US-PATENT-CLASS-351-237) Avail: U.S. Patent and Trademark Office CSCL 06B

An apparatus for training the human visual accommodation system is described. Specifically, the apparatus is useful for training personnel to volitionally control focus to the far point (normally infinity) from a position of myopia due to functional causes. The functional causes could be due, for example, to a behavioral accommodative spasm or the effects of an empty field. The device may also be used to measure accommodation, the accommodation resting position and the near and far points of vision. The device comprises a number of optical elements arranged on a single optical axis. Several of the elements are arranged in order on a movable stage in fixed relationship to each other: a light source, a lens, a target, an aperture and/or a second lens. On a base and in fixed relationship to each other are eyepiece and third lens. A stage generates an image of the target and the stage is movable with respect to the base by means of a knob. The device is utilized for the various training and test functions by following a series of procedural steps, and interchanging the apertures as necessary for the selected procedure.

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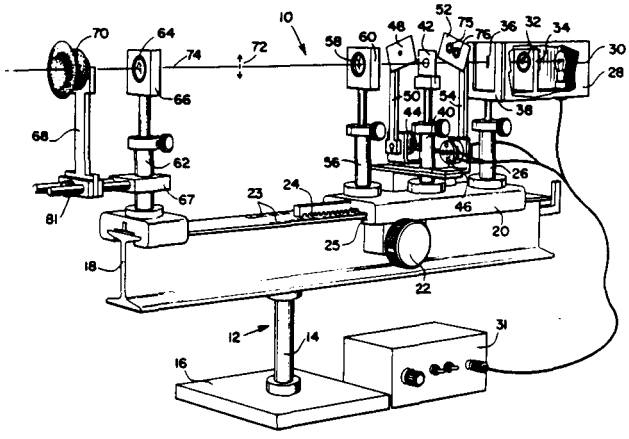


54

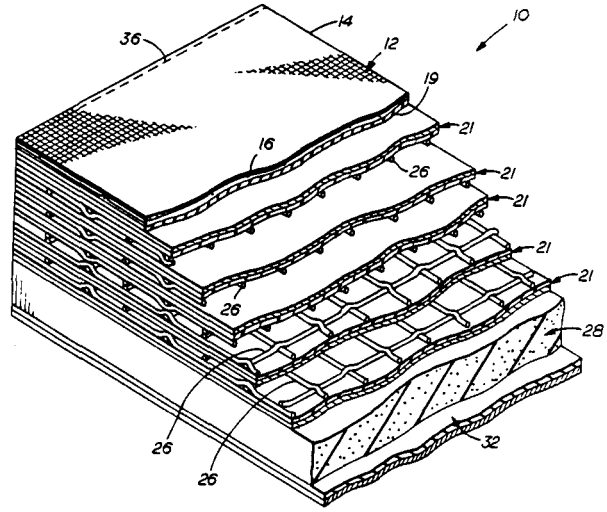
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N89-12206*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
HAZARDS PROTECTION FOR SPACE SUITS AND SPACECRAFT Patent Application
JOSEPH J. KOSMO, inventor (to NASA) and FREDERICK S. DAWN, inventor (to NASA) 30 Jun. 1988 16 p
(NASA-CASE-MSC-21366-1; NAS 1.71:MSC-21366-1; US-PATENT-APPL-SN-213880) Avail: NTIS HC A03/MF A01 CSCL 06K

A flexible multi-layered covering for protection against the hazards of exposure to the environment of outer space is presented. The covering includes an outer layer section comprising an outmost lamina of woven expanded tetrafluorethylene yarns (Gore-Tex) for protecting against abrasion and tearing, an underlying weave of meta-aramid yarns (Nomex) and para-aramid yarns (Kevlar) for particle impact protection, an electrostatic charge dissipation and control system incoporated therein, and a chemical contaminants control barrier applied as a coating. A middle section includes a succession of thermal insulating layers of polymeric thermoplastic or thermoforming material, each of which is coated with a metal deposit of high infrared emissivity and low solar radiation absorption characteristics and separated from adjacent insulating layers by a low thermal conductance material. The covering includes a radiation attenuating layer of a tungsten-loaded polymeric elastomer binder for protecting against bremsstrahlung radiation and an inner layer of rip-stop polyester material for abrasion protection. A chloroprene coating may be supplied by polyester-material for added micrometeroid protection. Securing the means of low heat conductance material secures the multi-layers together as a laminar composite.

NASA

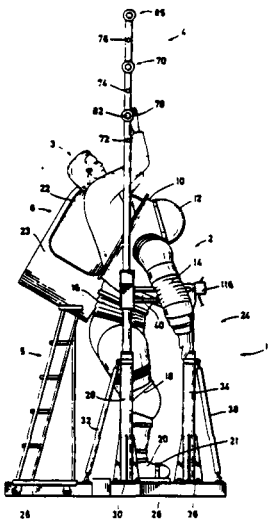


N89-13889*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
DON/DOFF SUPPORT STAND FOR USE WITH REAR ENTRY SPACE SUITS Patent Application
JOSEPH J. KOSMO, inventor (to NASA), TERRY O. TRI, inventor (to NASA), WILLIAM E. SPENNY, inventor (to NASA), and PHILIP R. WEST, inventor (to NASA) 19 Jul. 1988 22 p
(NASA-CASE-MSC-21364-1; NAS 1.71:MSC-21364-1;

US-PATENT-APPL-SN-221472) Avail: NTIS HC A03/MF A01 CSCL 06K

A don/doff support stand for use with rear entry space suits is disclosed. The support stand is designed for use in one-g environments; however, certain features of the stand can be used on future spacecraft, lunar, or planetary bases. The present invention has a retainer which receives a protrucing lug fixed on the torso section of the space suit. When the lug is locked in the retainer, the space suit is held in a generally upright position. In a one-g environment a portable ladder is positioned adjacent to the rear entry of the space suit supported by the stand. The astronaut climbs up the ladder and grasps a hand bar assembly positioned above the rear entry. The astronaut then slips his legs through the open rear entry and down into the abdominal portion of the suite. The astronaut then lowers himself fully into the suit. The portable ladder is then removed and the astronaut can close the rear entry door. The lug is then disengaged from the retainer and the astronaut is free to engage in training exercises in the suit. When suit use is over, the astronaut returns to the stand and inserts the lug into the retainer. A technician repositions the ladder. The astronaut opens the rear entry door, grasps the hand bar assembly and does a chin-up to extricate himself from the suit. The astronaut climbs down the movable ladder while the suit is supported by the stand.

NASA



71

ACOUSTICS

Includes sound generation, transmission, and attenuation.

N89-13236* National Aeronautics and Space Administration. Pasadena Office, CA.

STABILIZATION AND OSCILLATION OF AN ACOUSTICALLY LEVITATED OBJECT Patent

MARTIN B. BARMATZ, inventor (to, NASA) and STEVEN L. GARRETT, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 27 Sep. 1988 12 p Filed 20 Aug. 1987 (NASA-CASE-NPO-16896-1-CU; US-PATENT-4,773,266; US-PATENT-APPL-SN-087283; US-PATENT-CLASS-73-505) Avail: US Patent and Trademark Office CSCL 20A

Methods are described for rapidly damping oscillation of an acoustically levitated object or for causing and maintaining such oscillations, and a method is provided for determining the restoring force constant K on the levitated object by measuring its frequency of oscillation. Oscillations of a levitated object are damped by applying levitating acoustic energy at a frequency slightly less than the center resonant frequency. Oscillations are maintained by applying acoustic energy slightly greater than the center resonant frequency. The restoring force constant of the levitation force is proportional to the square of the frequency of oscillation of the object.

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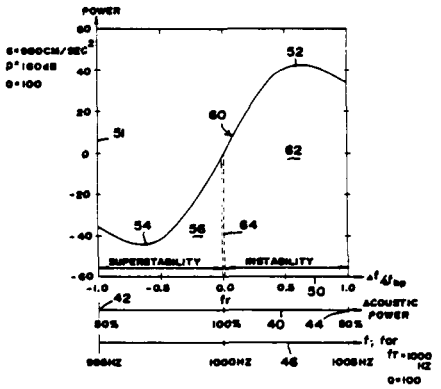


74

OPTICS

Includes light phenomena; and optical devices.

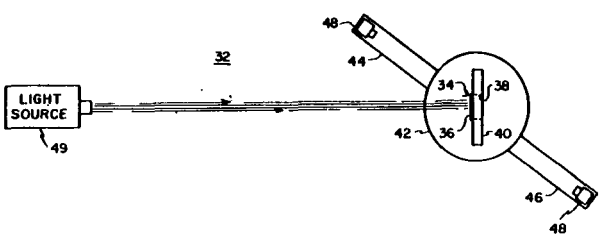
N89-13253*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

A REFERENCE STANDARD FOR BIDIRECTIONAL REFLECTION DISTRIBUTION FUNCTION AND BIDIRECTIONAL TRANSMISSION DISTRIBUTION FUNCTION MEASUREMENT Patent Application

WILLIAM K. WITHEROW, inventor (to NASA) 15 Sep. 1988 15 p (NASA-CASE-MFS-28183-1; NAS 1.71:MFS-28183-1; US-PATENT-APPL-SN-244367) Avail: NTIS HC A03/MF A01 CSCL 20F

A Lambertian reference standard for uniformly scattering a beam of light is constructed of a plate having a planar surface with a layer of glue disposed on the surface. An evenly packed layer of monodisperse spheres is set in the layer, and when the standard is used for bi-directional (BRDF) measurements, the spheres are coated with a layer of highly relective substance, such as gold or silver. When the standard is used for bi-directional transmittance distribution function (BTDF) measurements, the spheres are of a transparent material and are provided with a roughened surface, as by acid etching. In this case, the layer of glue is an optical cement, and the plate is of glass, with the spheres, the layer, and the plate all possessing a similar refractive index.

NASA



N89-14077* National Aeronautics and Space Administration. Pasadena Office, CA.
DYNAMIC RANGE COMPRESSION/EXPANSION OF LIGHT BEAMS BY PHOTOREFRACTIVE CRYSTALS Patent
LI-JEN CHENG, inventor (to NASA) and HUA-KUANG LIU, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 20 Sep. 1988 7 p Filed 24 Nov. 1987 Supersedes N88-24508 (26 - 17, p 2438)
(NASA-CASE-NPO-17140-1-CU; US-PATENT-4,772,785; US-PATENT-APPL-SN-125021; US-PATENT-CLASS-250-216; US-PATENT-CLASS-350-354) Avail: US Patent and Trademark Office CSCL 20F

An apparatus is provided which greatly reduces the intensity of bright portions of an image while only moderately reducing the brightness of dimmer portions of the image, to thereby compress the range of light intensities to facilitate detection of the image. The apparatus includes a light detector device formed by a chip of photorefractive material. A 2-D array of light beams from an object to be detected passes through a beam splitter to form two arrays of light beams. The two arrays are directed at different angles against a surface of the chip of photorefractive material, the two arrays of light beams forming coincident images on the surface. One of the 2-D arrays of beams emerging from an opposite surface of the chip has a lower range of intensities, to facilitate detection of the object despite very bright spots in its image. The other array of light beams emerging from the chip has a greater range of intensities than the unprocessed image of the object.

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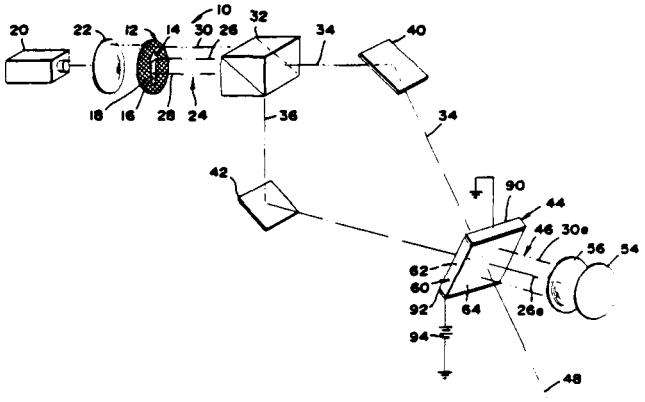

N89-14078* National Aeronautics and Space Administration. Pasadena Office, CA.
REMOTELY CONTROLLABLE REAL-TIME OPTICAL PROCESSOR Patent
HUA-KUANG LIU, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 20 Sep. 1988 6 p Filed 7 Nov. 1986 Supersedes N87-19064 (25 - 11, p 1520)
(NASA-CASE-NPO-16750-1-CU; US-PATENT-4,772,101; US-PATENT-APPL-SN-927972; US-PATENT-CLASS-350-337; US-PATENT-CLASS-350-331-R; US-PATENT-CLASS-350-342; US-PATENT-CLASS-350-162.13; US-PATENT-CLASS-382-31) Avail: US Patent and Trademark Office CSCL 20F

An optical processor is provided which facilitates selection of any of a variety of patterns or images which are to be compared with a Fourier transform of a template image, wherein the processor can be constructed at low cost. One of the two images that are to be compared is formed by generating video signals representing the image and using those signals to drive a liquid crystal array through which light passes.

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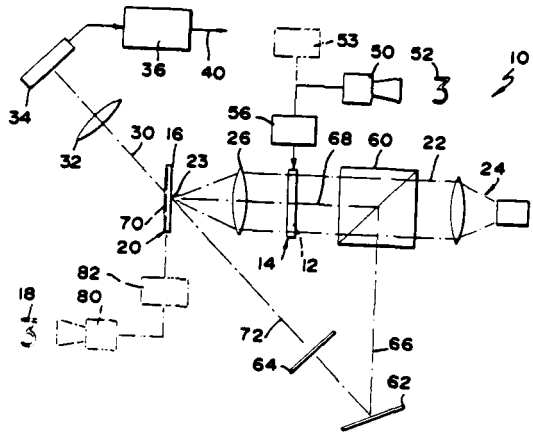


76

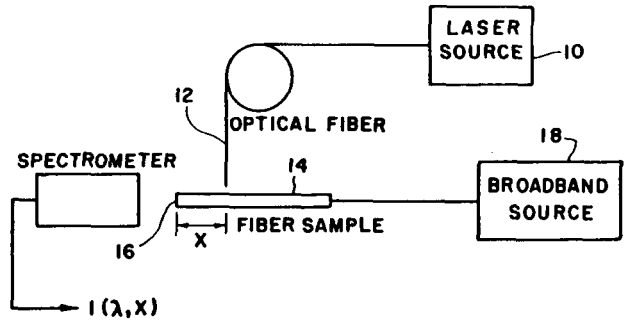
SOLID-STATE PHYSICS

Includes superconductivity.

N89-14119*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
METHOD AND APPARATUS FOR DETERMINING OPTICAL ABSORPTION AND EMISSION CHARACTERISTICS OF A CRYSTAL OR NON-CRYSTALLINE FIBER Patent Application
CHARLES E. BYVIK, inventor (to NASA) and A. MARTIN BUONCRISTIANI, inventor (to NASA) (Buoncristiani, A. Martin, Newport News, Va) 16 Aug. 1988 16 p
(NASA-CASE-LAR-13963-1; NAS 1.71:LAR-13963-1; US-PATENT-APPL-SN-232735) Avail: NTIS HC A03/MF A01 CSCL 20L

This invention relates generally to spectroscopy and, more particularly, to a method and apparatus for performing spectroscopic analysis of crystal and noncrystalline fibers. The invention provides a complete absorption curve for a material using a crystal fiber which can be more easily produced than the types of samples required for other methods of obtaining substantially the same absorption curve for identical materials.

NASA



N89-14120*# National Aeronautics and Space Administration. Pasadena Office, CA.

PREPARATION OF DILUTE MAGNETIC SEMICONDUCTOR FILMS BY METALORGANIC CHEMICAL VAPOR DEPOSITION

Patent Application

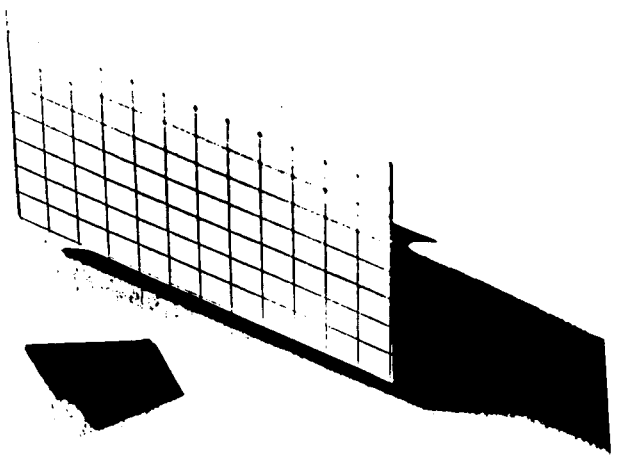
AKBAR NOUHI, inventor (to NASA) and RICHARD J. STIRN, inventor (to NASA) (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) 23 Sep. 1988 28 p

(Contract NAS7-918)

(NASA-CASE-NPO-17399-1-CU; NAS 1.71:NPO-17399-1-CU; US-PATENT-APPL-SN-248019) Avail: NTIS HC A03/MF A01 CSCL 20L

A method for preparation of a dilute magnetic semiconductor (DMS) film is provided, in which a Group II metal source, a Group VI metal source and a transition metal magnetic ion source are pyrolyzed in the reactor of a metalorganic chemical vapor deposition (MOCVD) system by contact with a heated substrate. As an example, the preparation of films of Cd(sub 1-x)Mn(sub x)Te, in which 0 is less than or equal to x less than or equal to 0.7, on suitable substrates (e.g., GaAs) is described. As a source of manganese, tricarbonyl (methylcyclopentadienyl) manganese (TCPMn) is employed. To prevent TCPMn condensation during its introduction into the reactor, the gas lines, valves and reactor tubes are heated. A thin-film solar cell of n-i-p structure, in which the i-type layer comprises a DMS, is also described; the i-type layer is suitably prepared by MOCVD.

NASA



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ERC-xxxxx XER-xxxxx HQN-xxxxx XHQ-xxxxx	NASA Headquarters Mail Code: GP Washington, D.C. 20546 Telephone: (202) 453-2417
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PATENT LICENSING REGULATIONS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

14 CFR Part 1245

Licensing of NASA Inventions

AGENCY: National Aeronautics and Space Administration
ACTION: Interim regulation with comments requested.

SUMMARY: The National Aeronautics and Space Administration (NASA) is revising its patent licensing regulations to conform with Pub. L. 96-517. This interim regulation provides policies and procedures applicable to the licensing of federally owned inventions in the custody of the National Aeronautics and Space Administration, and implements Pub. L. 96-517. The object of this subpart is to use the patent system to promote the utilization of inventions arising from NASA supported research and development.

EFFECTIVE DATE: July 1, 1981. Comments must be received in writing by December 2, 1981. Unless a notice is published in the **Federal Register** after the comment period indicating changes to be made, this interim regulation shall become a final regulation.

ADDRESS: Mr. John G. Mannix, Director of Patent Licensing, GP-4, NASA, Washington, D.C. 20546

FOR FURTHER INFORMATION CONTACT:
Mr. John G. Mannix, (202) 755-3954.

SUPPLEMENTARY INFORMATION:

PART 1245—PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS

Subpart 2 of Part 1245 is revised to read as follows:

* * * * *

Subpart 2—Licensing of NASA Inventions

Sec.

Restrictions and Conditions

Types of Licenses

Procedures

Authority: 35 U.S.C. Section 207 and 208.94 Stat 3023 and 3024.

* * * * *

Subpart 2—Licensing of NASA Inventions

§ 1245.200 Scope of subpart.

This subpart prescribes the terms, conditions and procedures upon which a NASA invention may be licensed. It does not affect licenses which (a) were in effect prior to July 1, 1981; (b) may exist at the time of the Government's acquisition of title to the invention, including those resulting from the allocation of rights to inventions made under Government research and development contracts; (c) are the result of an authorized exchange of rights in the settlement of patent disputes; or (d) are otherwise authorized by law or treaty.

§ 1245.201 Policy and objective.

It is the policy and objective of this subpart to use the patent system to promote the utilization of inventions arising from NASA supported research and development.

§ 1245.202 Definitions

(a) "Federally owned invention" means an invention, plant, or design which is covered by a patent, or patent application in the United States, or a patent, patent application, plant variety protection, or other form of protection, in a foreign country, title to which has been assigned to or otherwise vested in the United States Government.

(b) "Federal agency" means an executive department, military department, Government corporation, or independent establishment, except the Tennessee Valley Authority, which has custody of a Federally owned invention.

(c) "NASA Invention" means a Federally owned invention with respect to which NASA maintains custody and administration, in whole or in part, of the right, title or interest in such invention on behalf of the United States Government.

(d) "Small business firm" means a small business concern as defined at section 2 of Pub. L. 85-536 (15 U.S.C. 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of these regulations, the size standard for small business concerns involved in Government procurement, contained in 13 CFR 121.3-8, and in subcontracting, contained in 13 CFR 121.3-12, will be used.

(e) "Practical application" means to manufacture in the case of a composition or product, to practice in the case of a process or method, or to operate in the case of a machine or system; and, in each case, under such condition, as to establish that the invention is being utilized and that its benefits are to the extent permitted by law or Government regulations available to the public on reasonable terms.

(f) "United States" means the United States of America, its territories and possessions, the District of Columbia, and the Commonwealth of Puerto Rico.

§ 1245.203 Authority to grant licenses.

NASA inventions shall be made available for licensing as deemed appropriate in the public interest. NASA may grant nonexclusive, partially exclusive, or exclusive licenses thereto under this subpart on inventions in its custody.

Restrictions and Conditions

§ 1245.204 All licenses granted under this subpart.

(a) *Restrictions.* (1) A license may be granted only if the applicant has supplied NASA with a satisfactory plan for development or marketing of the invention, or both, and with information about the applicant's capability to fulfill the plan.

(2) A license granting rights to use or sell under a NASA invention in the United States shall normally be granted only to a licensee who agrees that any products embodying the invention or produced through the use of the invention will be manufactured substantially in the United States.

(b) *Conditions.* Licenses shall contain such terms and conditions as NASA determines are appropriate for the protection of the interests of the Federal Government and the public and are not in conflict with law or this subpart. The following terms and conditions apply to any license:

(1) The duration of the license shall be for a period specified in the license agreement, unless sooner terminated in accordance with this subpart.

(2) The license may be granted for all or less than all fields of use of the invention or in specified geographical areas, or both.

(3) The license may extend to subsidiaries of the licensee or other parties if provided for in the license but shall be nonassignable without approval of NASA, except to the successor of that part of the licensee's business to which the invention pertains.

(4) The license may provide the licensee the right to grant sublicenses under the license, subject to the approval of NASA. Each sublicense shall make reference to the license, including the rights retained by the Government, and a copy of such sublicense shall be furnished to NASA.

(5) The license shall require the licensee to carry out the plan for development or marketing of the invention, or both, to bring the invention to practical application within a period specified in the license, and to continue to make the benefits of the invention reasonably accessible to the public.

(6) The license shall require the licensee to report periodically on the utilization or efforts at obtaining utilization that are being made by the licensee, with particular reference to the plan submitted.

(7) All licenses shall normally require royalties or other consideration.

(8) Where an agreement is obtained pursuant to § 1245.204(a)(2) that any products embodying the invention or produced through use of the invention will be manufactured substantially in the United States, the license shall recite such agreement.

(9) The license shall provide for the right of NASA to terminate the license, in whole or in part, if:

(i) NASA determines that the licensee is not executing the plan submitted with its request for a license and the licensee cannot otherwise demonstrate to the satisfaction of NASA that it has taken or can be expected to take within a reasonable time effective steps to achieve practical application of the invention;

(ii) NASA determines that such action is necessary to meet requirements for public use specified by Federal regulations issued after the date of the license and such requirements are not reasonably satisfied by the licensee;

(iii) The licensee has willfully made a false statement of or willfully omitted a material fact in the license application or in any report required by the license agreement; or

(iv) The licensee commits a substantial breach of a covenant or agreement contained in the license.

(10) The license may be modified or terminated, consistent with this subpart, upon mutual agreement of NASA and the licensee.

(11) Nothing relating to the grant of a license, nor the grant itself, shall be construed to confer upon any person any immunity from or defenses under the antitrust laws or from a charge of patent misuse, and the acquisition and use of rights pursuant to this subpart shall not be immunized from the operation of state or Federal law by reason of the source of the grant.

Types of Licenses

§ 1245.205 Nonexclusive licenses.

(a) *Availability of licenses.* Nonexclusive licenses may be granted under NASA inventions without publication of availability or notice of a prospective license.

(b) *Conditions.* In addition to the provisions of § 1245.204, the nonexclusive license may also provide that, after termination of a period specified in the license agreement, NASA may restrict the license to the fields of use or geographic areas, or both, in which the licensee has brought the invention to practical application and continues to make the benefits of the invention reasonably accessible to the public. However, such restriction shall be made only in order to grant an exclusive or partially exclusive license in accordance with this subpart.

§ 1245.206 Exclusive and partially exclusive licenses.

(a) Domestic licenses.

(1) *Availability of licenses.* Exclusive or partially exclusive licenses may be granted on NASA inventions: (i) 3 months after notice of the invention's availability has been announced in the **Federal Register;** or (ii) without such notice where NASA determines that expeditious granting of such a license will best serve the interests of the Federal Government and the public; and (iii) in either situation, specified in (a)(1)(i) or (ii) of this section only if:

(A) Notice of a prospective license, identifying the invention and the prospective licensee, has been published in the **Federal Register,** providing opportunity for filing written objections within a 60-day period;

(B) After expiration of the period in § 1245.206(a)(1)(iii)(A) and consideration of nay written objections received during the period, NASA has determined that:

(*1*) The interests of the Federal Government and the public will best be served by the proposed license, in view of the applicant's intentions, plans, and ability to bring the invention to practical application or otherwise promote the invention's utilizaiton by the public;

(*2*) The desired practical application has not been achieved, or is not likely expeditiously to be achieved, under any nonexclusive license which has been granted, or which may be granted, on the invention;

(*3*) Exclusive or partially exclusive licensing is a reasonable and necessary incentive to call forth the investment of risk capital and expenditures to bring the invention to practical application or otherwise promote the invention's utilization by the public; and

(*4*) The proposed terms and scope of exclusivity are not greater than reasonably necessary to provide the incentive for bringing the invention to practical application or otherwise promote the invention's utilization by the public;

(C) NASA has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the country in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with the antitrust laws; and

(D) NASA has given first preference to any small business firms submitting plans that are determined by the agency to be within the capabilities of the firms and as equally likely, if executed, to bring the invention to practical application as any plans submitted by applicants that are not small business firms.

(2) *Conditions.* In addition to the provisions of § 1245.204, the following terms and conditions apply to domestic exclusive and partially exclusive licenses:

(i) The license shall be subject to the irrevocable, royalty-free right of the Government of the United States to practice and have practiced the invention on behalf of the United States and on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.

(ii) The license shall reserve to NASA the right to require the licensee to grant sublicenses to responsible applicants, on reasonable terms, when necessary to fulfill health or safety needs.

(iii) The license shall be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iv) The license may grant the licensee the right of enforcement of the licensed patent pursuant to the provisions of Chapter 29 of Title 35, United States Code, or other statutes, as determined appropriate in the public interest.

(b) Foreign licenses.

(1) *Availability of licenses.* Exclusive or partially exclusive licenses may be granted on a NASA invention covered by a foreign patent, patent application, or other form of protection, provided that:

(i) Notice of a prospective license, identifying the invention and prospective licensee, has been published in the **Federal Register,** providing opportunity for filing written objections within a 60-day period and following consideration of such objections;

(ii) NASA has considered whether the interests of the Federal Government or United States industry in foreign commerce will be enhanced; and

(iii) NASA has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the United States in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with antitrust laws.

(2) *Conditions.* In addition to the provisions of § 1245.204, the following terms and conditions apply to foreign exclusive and partially exclusive licenses:

(i) The license shall be subject to the irrevocable, royalty-free right of the Government of the United States to practice and have practiced the invention on behalf of the United States and on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.

(ii) The license shall be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iii) The license may grant the licensee the right to take any suitable and necessary actions to protect the licensed property, on behalf of the Federal Government.

(c) *Record of determinations.* NASA shall maintain a record of determinations to grant exclusive or partially exclusive licenses.

Procedures

§ 1245.207 Application for a license.

An application for a license should be addressed to the Patent Counsel at the NASA installation having responsibility for the invention and shall normally include:

(a) Identification of the invention for which the license is desired, including the patent application serial number or patent number, title, and date, if known;

(b) Identification of the type of license for which the application is submitted;

(c) Name and address of the person, company, or organization applying for the license and the citizenship or place of incorporation of the applicant;

(d) Name, address, and telephone number of representative of applicant to whom correspondence should be sent;

(e) Nature and type of applicant's business, identifying products or services which the applicant has successfully commercialized, and approximate number of applicant's employees;

(f) Source of information concerning the availability of a license on the invention;

(g) A statement indicating whether applicant is a small business firm as defined in § 1245.202(c);

(h) A detailed description of applicant's plan for development or marketing of the invention, or both, which should include:

(1) A statement of the time, nature and amount of anticipated investment of capital and other resources which applicant believes will be required to bring the invention to practical application;

(2) A statement as to applicant's capability and intention to fulfill the plan, including information regarding manufacturing, marketing, financial, and technical resources;

(3) A statement of the fields of use for which applicant intends to practice the invention; and

(4) A statement of the geographic areas in which applicant intends to manufacture any products embodying the invention and geographic areas where applicant intends to use or sell the invention, or both;

(i) Identification of licenses previously granted to applicant under Federally owned inventions;

(j) A statement containing applicant's best knowledge of the extent to which the invention is being practiced by private industry or Government, or both, or is otherwise available commercially; and

(k) Any other information which applicant believes will support a determination to grant the license to applicant.

§ 1245.208 Processing applications.

(a) Applications for licenses will be initially reviewed by the Patent Counsel of the NASA installation having responsibility for the invention. The Patent Counsel shall make a preliminary recommendation to the Director of Licensing, NASA Headquarters, whether to: (1) grant the license as requested, (2) grant the license with modification after negotiation with the licensee, or (3) deny the license. The Director of Licensing shall review the preliminary recommendation of the Patent Counsel and make a final recommendation to the NASA Assistant General Counsel for Patent Matters. Such review and final recommendation may include, and be based on, any additional information obtained from applicant and other sources that the Patent Counsel and the Director of Licensing deem relevant to the license requested. The determination to grant or deny the license shall be made by the Assistant General Counsel for Patent Matters based on the final recommendation of the Director of Licensing.

(b) When notice of a prospective exclusive or partially exclusive license is published in the **Federal Register** in accordance with § 1245.206(a)(1)(iii)(A) or § 1245.206(b)(1)(i), any written objections received in response thereto will be considered by the Director of Licensing in making the final recommendation to the Assistant General Counsel for Patent Matters.

(c) If the requested license, including any negotiated modifications, is denied by the Assistant General Counsel for Patent Matters, the applicant may request reconsideration by filing a written request for reconsideration within 30 days after receiving notice of denial. This 30-day period may be extended for good cause.

(d) In addition to, or in lieu of requesting reconsideration, the applicant may also appeal the denial of the license in accordance with § 1245.211.

§ 1245.209 Notice to Attorney General.

A copy of the notice provided for in §§ 1245.206(a)(1)(iii)(A), and 1245.206(b)(1)(i) will be sent to the Attorney General.

§ 1245.210 Modification and termination of licenses.

Before modifying or terminating a license, other than by mutual agreement, NASA shall furnish the licensee and any sublicensee of record a written notice of intention to modify or terminate the license, and the licensee and any sublicensee shall be allowed 30 days after such notice to remedy any breach of the license or show cause why the license should not be modified or terminated.

§ 1245.211 Appeals.

(a) The following parties may appeal to the NASA Administrator or designee any decision or determination concerning the grant, denial, interpretation, modification, or termination of a license:

(1) A person whose application for a license has been denied;

(2) A licensee whose license has been modified or terminated, in whole or in part; or

(3) A person who timely filed a written objection in response to the notice required by §§ 1245.206(a)(1)(iii)(A) or 1245.206(b)(1)(i) and who can demonstrate to the satisfaction of NASA that such person may be damaged by the Agency action.

(b) Written notice of appeal must be filed within 30 days (or such other time as may be authorized for good cause shown) after receiving notice of the adverse decision or determination; including, an adverse decision following the request for reconsideration under § 1245.208(c). The notice of appeal, along with all supporting documentation should be addressed to the Administrator, National Aeronautics and Space Administration, Washington, DC 20546. Should the appeal raise a genuine dispute over material facts, fact-finding will be conducted by the NASA Inventions and Contributions Board. The person filing the appeal shall be afforded an opportunity to be heard and to offer evidence in support of the appeal. The Chairperson of the Inventions and Contributions Board shall prepare written findings of fact and transmit them to the Administrator or designee. The decision on the appeal shall be made by the NASA Administrator or designee. There is no further right of administrative appeal from the decision of the Administrator or designee.

§ 1245.212 Protection and administration of inventions.

NASA may take any suitable and necessary steps to protect and administer rights to NASA inventions, either directly or through contract.

§ 1245.213 Transfer of custody.

NASA having custody of certain Federally owned inventions may transfer custody and administration in whole or in part, to another Federal agency, of the right, title, or interest in any such invention.

§ 1245.214 Confidentiality of information.

Title 35, United States Code, section 209, provides that any plan submitted pursuant to § 1245.207(h) and any report required by § 1245.204(b)(6) may be treated by NASA as commercial and financial information obtained from a person and privileged and confidential and not subject to disclosure under section 552 of Title 5 of the United States Code.

James M. Beggs,

Administrator.

October 15, 1981.

[FR Doc. 81-31609 Filed 10-30-81; 8:45 am]

BILLING CODE 7510-01-M

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA SP-7039 (35)		

4. Title and Subtitle	5. Report Date
NASA Patent Abstracts Bibliography A Continuing Bibliography Section 1: Abstracts (Supplement 35)	June, 1989
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
	10. Work Unit No.
9. Performing Organization Name and Address National Aeronautics and Space Administration Washington, DC 20546	11. Contract or Grant No.
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	14. Sponsoring Agency Code

15. Supplementary Notes

Section 1: Abstracts

16. Abstract

Abstracts are provided for 58 patents and patent applications entered into the NASA scientific and technical information system during the period January 1989 through June 1989. Each entry consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or patent application.

17. Key Words (Suggested by Authors(s))	18. Distribution Statement
Bibliographies Patent Policy NASA Programs	Unclassified - Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	38	A03/HC

* For sale by the National Technical Information Service, Springfield, Virginia 22161

NASA-Langley, 1989